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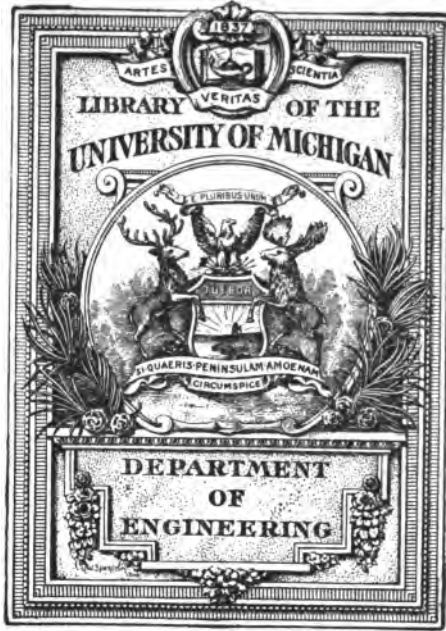
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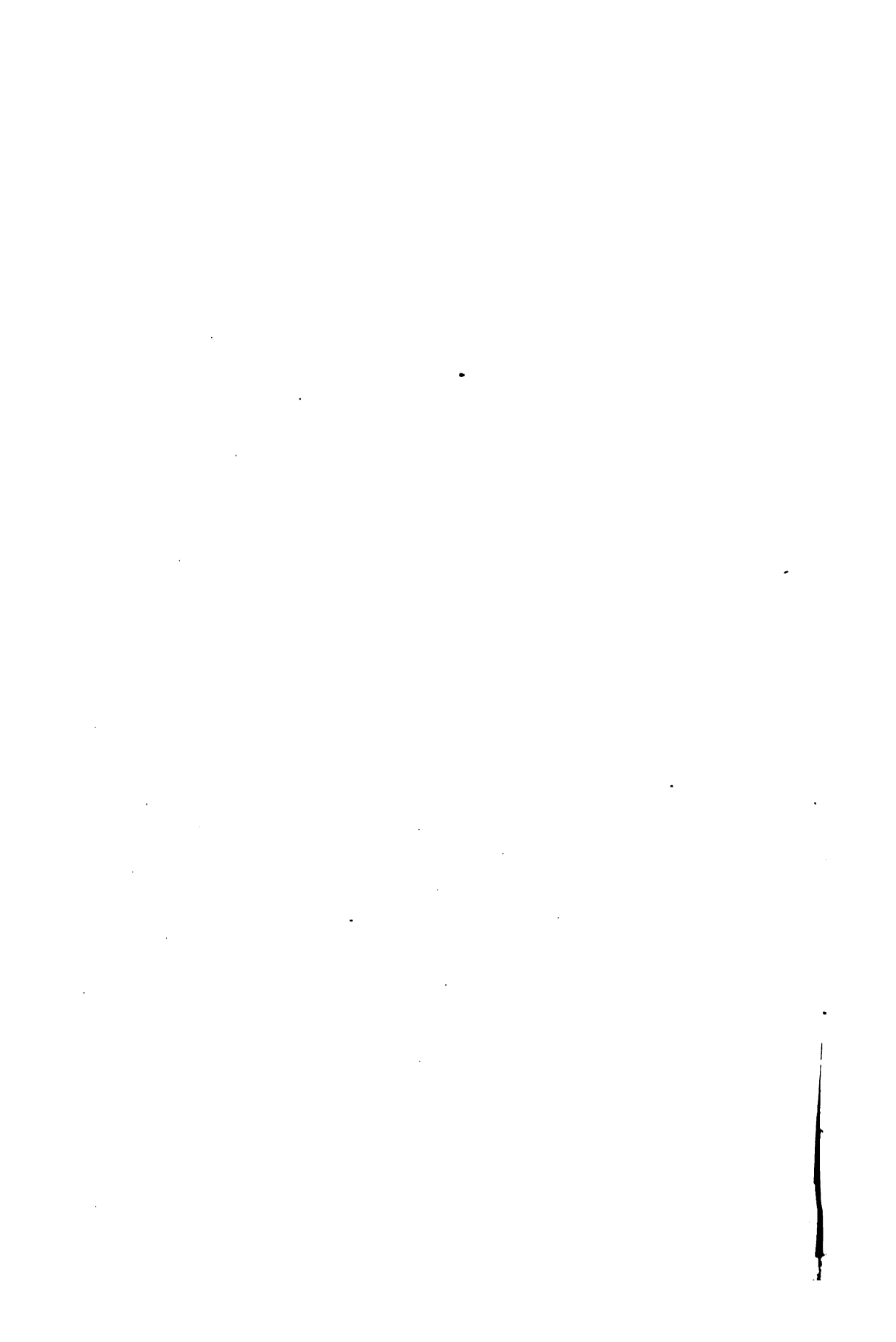
ANNUAL REPORT
OF THE
State Engineer and Surveyor
OF THE 125886
STATE OF NEW YORK.

For the Fiscal Year Ending September 30, 1902



TRANSMITTED TO THE LEGISLATURE JANUARY 23, 1903.

ALBANY:
THE ARGUS COMPANY, PRINTERS
1903



STATE OF NEW YORK.

No. 39.

IN ASSEMBLY,

JANUARY 23, 1903.

ANNUAL REPORT

OF THE

STATE ENGINEER AND SURVEYOR

OF NEW YORK.

OFFICE OF THE STATE ENGINEER AND SURVEYOR,

ALBANY, N. Y., *January 22, 1903.*

To the Honorable the Speaker of the Assembly:

SIR.—I have the honor to transmit herewith my annual report for the fiscal year ending September 30, 1902.

EDWARD A. BOND,

State Engineer and Surveyor.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

REPORT.

To the Honorable the Legislature of the State of New York:

I have the honor to present herewith my fourth annual report as State Engineer and Surveyor of New York.

This Department is charged by the provisions of the Constitution, by the Revised Statutes and by laws passed at each session of the Legislature with the duty of designing and supervising the various engineering operations for the construction and maintenance of the public works of the State.

These works are varied and extensive and the duties and responsibilities for them are constant and exacting. The further duties of the office of the State Engineer are those which are incident to his membership of the various commissions and boards of which the State Engineer and Surveyor is a member. From the several boards many subjects are referred to him for examination and report.

These boards and their duties are as follows:

The Canal Board.—Controlling the construction and maintenance of canals, and also hearing and adjudicating the claims of contractors for work done under the nine million improvement of 1895-97.

The Board of Commissioners of the Land Office.—Controlling the sale and purchase of State lands, and granting of lands under water.

The Board of State Canvassers.—Charged with the duty of canvassing the returns of elections.

The Board of Equalization of Assessment.—Charged with the duty of equalizing assessments of State taxes among the several counties.

The Flood Commission, created by chapter 406, Laws of 1902.—To investigate the causes of floods and of the overflow of rivers and of water courses and to make recommendations for preventing the same.

The Electrical Laboratory Commission, created by chapter 595, Laws of 1902.— To investigate and report as to the necessity for the establishment of a State electrical standardizing laboratory for electrical measuring instruments, apparatus and standards for the protection of municipalities and the general public in the use, and of producers in the generation, of electrical energy; of this commission, the State Engineer is chairman.

The principal duty of the State Engineer and Surveyor continues to be the design, construction and maintenance of the canal system of the State, and of such extensions thereof as may be required by the Legislature and by the people of the State.

The State Engineer is also charged with the duty of designing and constructing improved highways throughout the State under the provisions of chapter 115 of the Laws of 1898, known as the Higbie-Armstrong State Aid Law, and also of directing the maintenance of these improved highways under the provisions of chapter 53 of the Laws of 1902.

HISTORY OF THE CANAL.

At the present time the canal problem of the State is in its fifth stage since its origin in 1768, when Sir Henry Moore, Colonial Governor of New York, proposed improvements of the Mohawk river at Canajoharie, and in 1788, when Elkanah Watson proposed improving the natural channels by way of the Mohawk river to Wood creek, and thence through Oneida lake to the Oswego river and to Lake Ontario. This latter project was so far executed as to give navigation in 1796 for boats carrying sixteen tons from Schenectady westward 184 miles by the water route, or 150 miles in a direct line, to Seneca Falls, on the outlet of Seneca lake, the locks being first of wood, then of brick and finally of stone.

The second step was taken in 1808, when the Legislature directed Surveyor-General Simeon DeWitt to cause an accurate survey to be made of a route between the Hudson river and Lake Erie; the results of this survey were under consideration and discussion until 1816, when the Canal Law was passed authorizing

the construction of the Erie and Champlain canals, which were begun in 1817 and completed in 1825; the section to Lake Ontario at Oswego being begun in 1825 and completed in 1828. The waterway of the Erie canal and of the Oswego canal was then 28 feet wide at the bottom, 40 feet wide at surface of water, whose depth was four feet, the locks being 90 feet long by 12 feet wide. The Champlain canal was 20 feet by 30 feet wide with 3 feet depth of water and the locks were 75 feet by 10 feet.

The commercial success of this canal was so great that the third step was taken in 1835 when the enlargement of the Erie and the Oswego canals was begun and was completed in 1862, when the dimensions of the waterways were 52½ feet at the bottom and 70 feet at the surface of water, whose depth was 7 feet. The locks were 110 feet long by 18 feet wide, allowing passage of boats carrying 250 tons of freight, and on the Erie canal were built in pairs.

The fourth step was suggested in 1878, when the State Engineer in his annual report proposed a further enlargement and briefly formulated what has since been known as the "Seymour Plan," which was to "increase the depth of the canal to eight feet by lowering the bottom in some places and raising the banks in others." This step was further advanced in 1895, when the people of the State voted \$9,000,000 to thus increase the depth to nine feet in the waterway and eight feet in the locks and aqueducts, this being now known as the Seymour-Adams plan of 1895.

The fifth step was begun by my report on the surveys and estimates for a barge canal referred to Governor Odell on February 12, 1901, which was considered by the Legislature at that session.

From 1898 to 1901, a United States commission had in preparation a report and estimates for 21-foot and 30-foot ship canals through the State. Four years of time and \$485,000 of money were used in the preparation of this United States report, which was presented to Congress on December 1, 1901.

On March 15, 1901, Governor Odell presented my report on

large canal to the Legislature with a message which was reprinted in my last annual report.

The subject has since been under general discussion by the press throughout the State and has been considered by various commercial bodies and will doubtless be brought before the Legislature at this session preparatory to referring it to a vote of the people of the State.

This discussion has caused many inquiries regarding the Lake Ontario harbors which would be adjuncts of one of the routes, and this branch of the subject is covered at p. 60 of this volume.

The maintenance of the works of the present canal has been provided for by many appropriations and special acts during the last session of the Legislature, and the designing and construction of these works which are of unusual extent and variety, have received the attention of the State Engineer during the past year.

Changes have been made in the specifications prescribing the methods of work, which have been brought to agree with the latest methods employed by engineers in the design and construction of works of similar importance. The preparation of these standard specifications has received the attention which the importance of the subject merits, and the requirements for cement will be further increased to keep pace with the improvements made in its character.

The great improvement during recent years in the manufacture of American Portland cement and the advantage and economy to be obtained by substituting concrete for the much more expensive cut stone masonry, have been fully recognized, it being considered that the use of the best class of concrete instead of cut stone will give better results at less than half the cost.

A statement of the engineering expenses for the maintenance during the fiscal year and of the pending and completed contracts for the various works appears in the Appendix, at p. 48 of this report, and is also presented in detail in appended reports of the division engineers, at pp. 267, 317 and 384.



Condition, April 1, 1902.



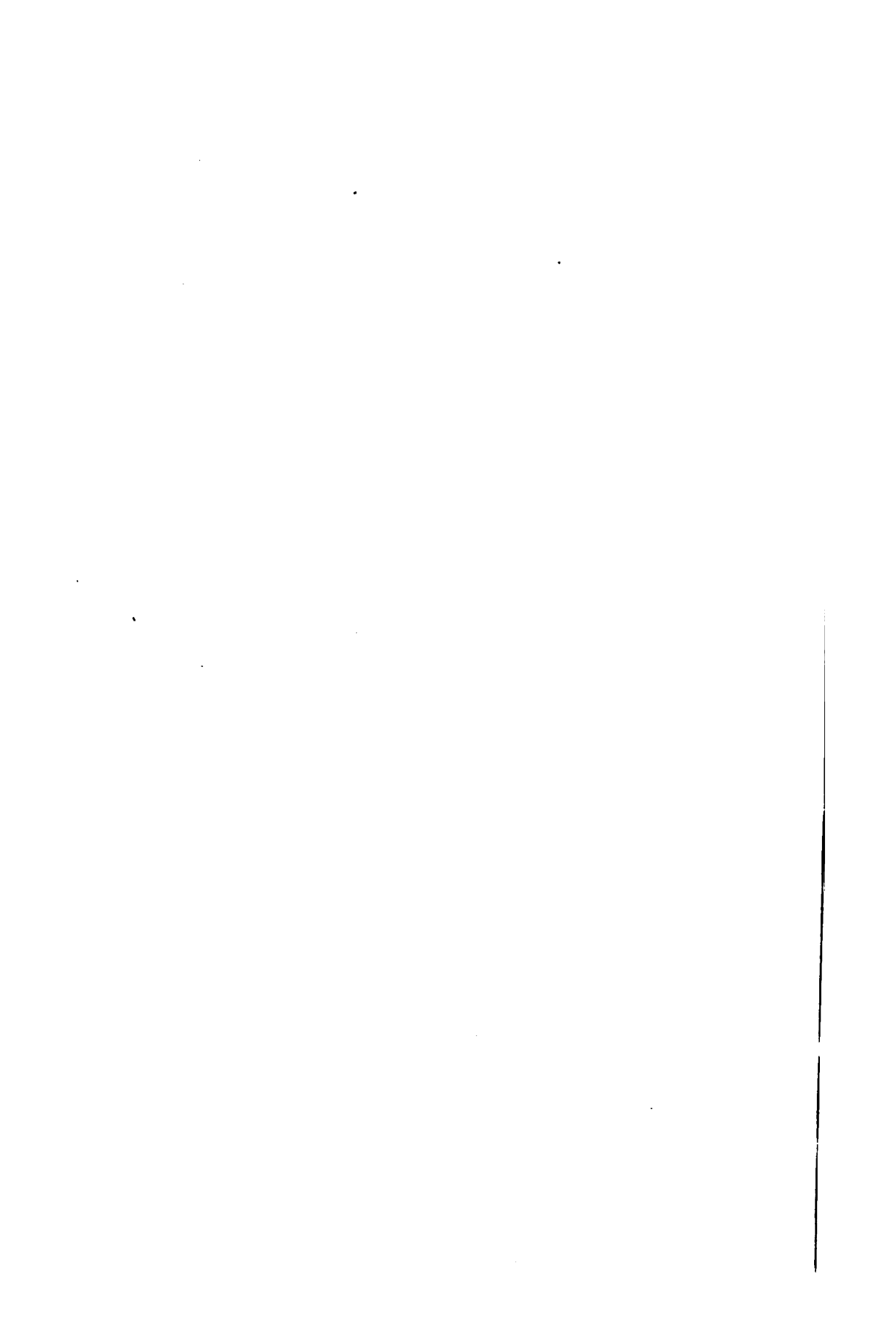
In progress, July 23, 1902.



Completed, August 5, 1902.

RENSSELAER COUNTY, N. Y. : TROY AND BRUNSWICK ROAD, No. 25, NORTHEAST,
FROM TROY, N. Y.

Showing improvement by State Engineer during 1902. Base and top of crushed
local quartzite, bound with screenings of the same



HIGHWAY IMPROVEMENTS.

The subject of highway improvement by State aid attracts the attention of the people of the State, and their interest is shown to be greatly enhanced as a result of the work which has been done by the State Engineer Department in building macadam roads in different portions of the State under the provisions of chapter 115, Laws of 1898.

Petitions have been received from 43 counties for 401 roads, having an estimated length of 2,007 miles.

Surveys have been made of 277 of these roads located in 40 counties, aggregating 1,159 miles in length, which are described as follows:

There have been built, or are now building, 115 of these macadam roads located in 23 counties, aggregating 317 miles in length, at an average actual cost of \$8,819 per mile; also 5 earth roads located in Orange and Rensselaer counties, aggregating 35 miles in length, which are described on page 11. The details of these various roads are shown on the accompanying tables.

Surveys, plans and estimates have been made and accepted and the counties' half of the estimated cost has been actually appropriated by the boards of supervisors for 99 macadam roads located in 22 counties, aggregating 339 miles in length, at an average estimated cost of \$8,212 per mile.

Surveys, plans and estimates have been made or are in progress for 62 roads, aggregating 466 miles in measured length, which will be submitted to the boards of supervisors at their coming sessions.

Surveys are yet to be made for 124 roads located in 25 counties, aggregating 848 miles in estimated length.

Roads Completed During Each Calendar Year.

| CALENDAR YEAR. | County. | Number of roads. | Miles completed. | Total miles. |
|---|------------------|------------------|------------------|--------------|
| 1899..... | Columbia..... | 1 | 1.25 | 5.50 |
| | Oneida..... | 1 | 2.25 | |
| | Schenectady..... | 1 | 2.00 | |
| | | 3 | | |
| 1900..... | Erie..... | 2 | 7.99 | 25.86 |
| | Monroe..... | 3 | 9.61 | |
| | Onondaga..... | 2 | 1.60 | |
| | Rensselaer..... | 1 | 1.00 | |
| | Ulster..... | 1 | 5.66 | |
| | | 9 | | |
| 1901..... | Albany..... | 1 | 3.41 | 27.97 |
| | Chemung..... | 2 | 3.621 | |
| | Erie..... | 1 | 1.155 | |
| | Herkimer..... | 1 | 1.110 | |
| | Monroe..... | 1 | 1.304 | |
| | Oneida..... | 1 | 1.40 | |
| | Rensselaer..... | 2 | 4.18 | |
| | Westchester..... | 4 | 11.79 | |
| | | 13 | | |
| 1902..... | Albany..... | 3 | 7.19 | 97.35 |
| | Broome..... | 1 | 1.75 | |
| | Chemung..... | 3 | 5.49 | |
| | Chenango..... | 1 | 0.47 | |
| | Clinton..... | 1 | 2.82 | |
| | Montgomery..... | 2 | 3.29 | |
| | Monroe..... | 3 | 4.71 | |
| | Orange..... | 4 | 32.02 | |
| | Rensselaer..... | 2 | 5.74 | |
| | Saratoga..... | 2 | 7.57 | |
| | Ulster..... | 1 | 4.00 | |
| | Washington..... | 1 | 1.25 | |
| | Westchester..... | 8 | 21.05 | |
| | | 32 | | |
| Total roads completed to December 31, 1902... | | 57 | | 156.68 |

About 90 miles of roads have been built during 1902 on incomplected contracts, and are not here included.

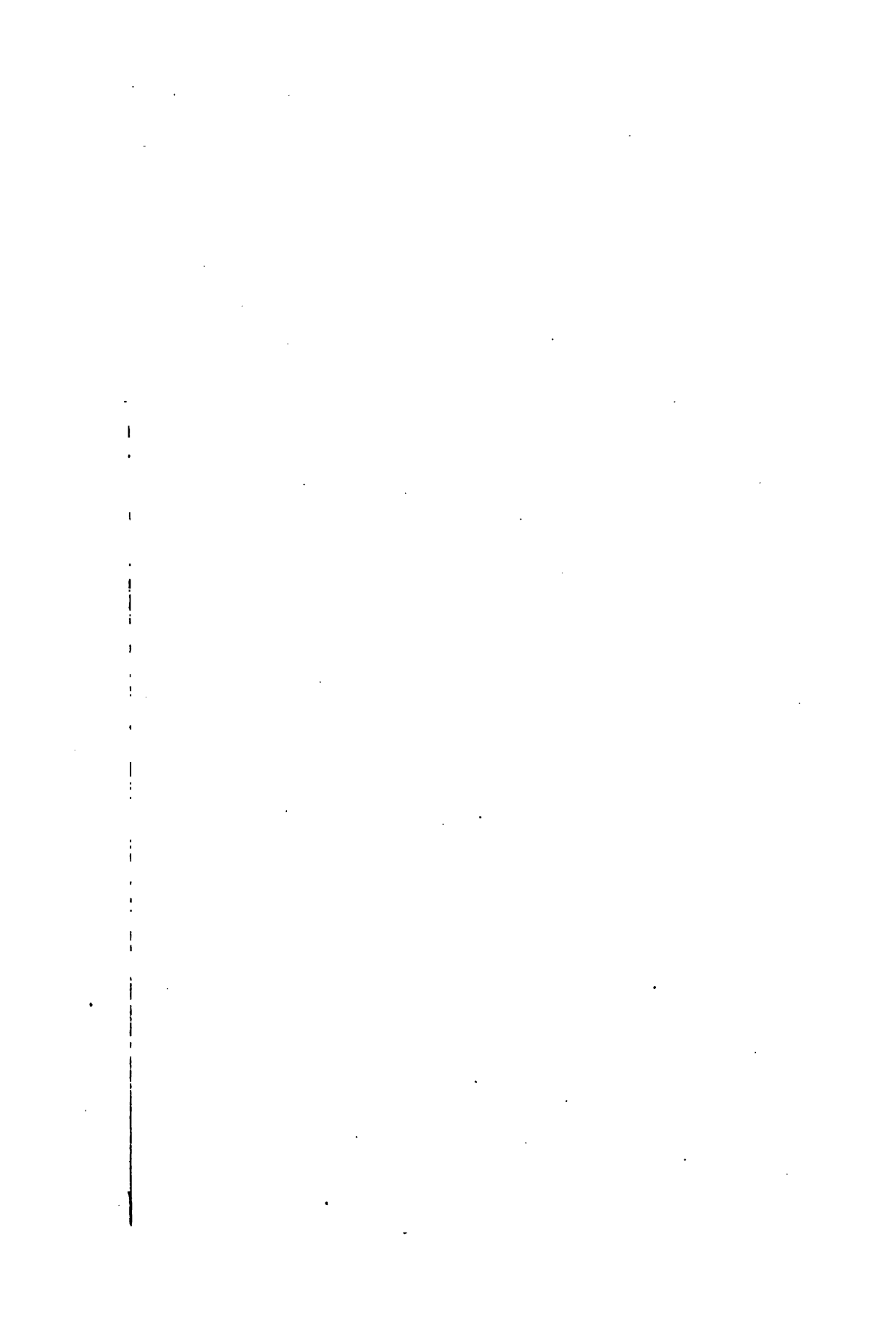
One-half of the cost of the roads thus built has been, or will be, paid from the sum of \$1,465,000, which is the total amount that has been appropriated by the State during the five years since the passage of law, March 24, 1898.

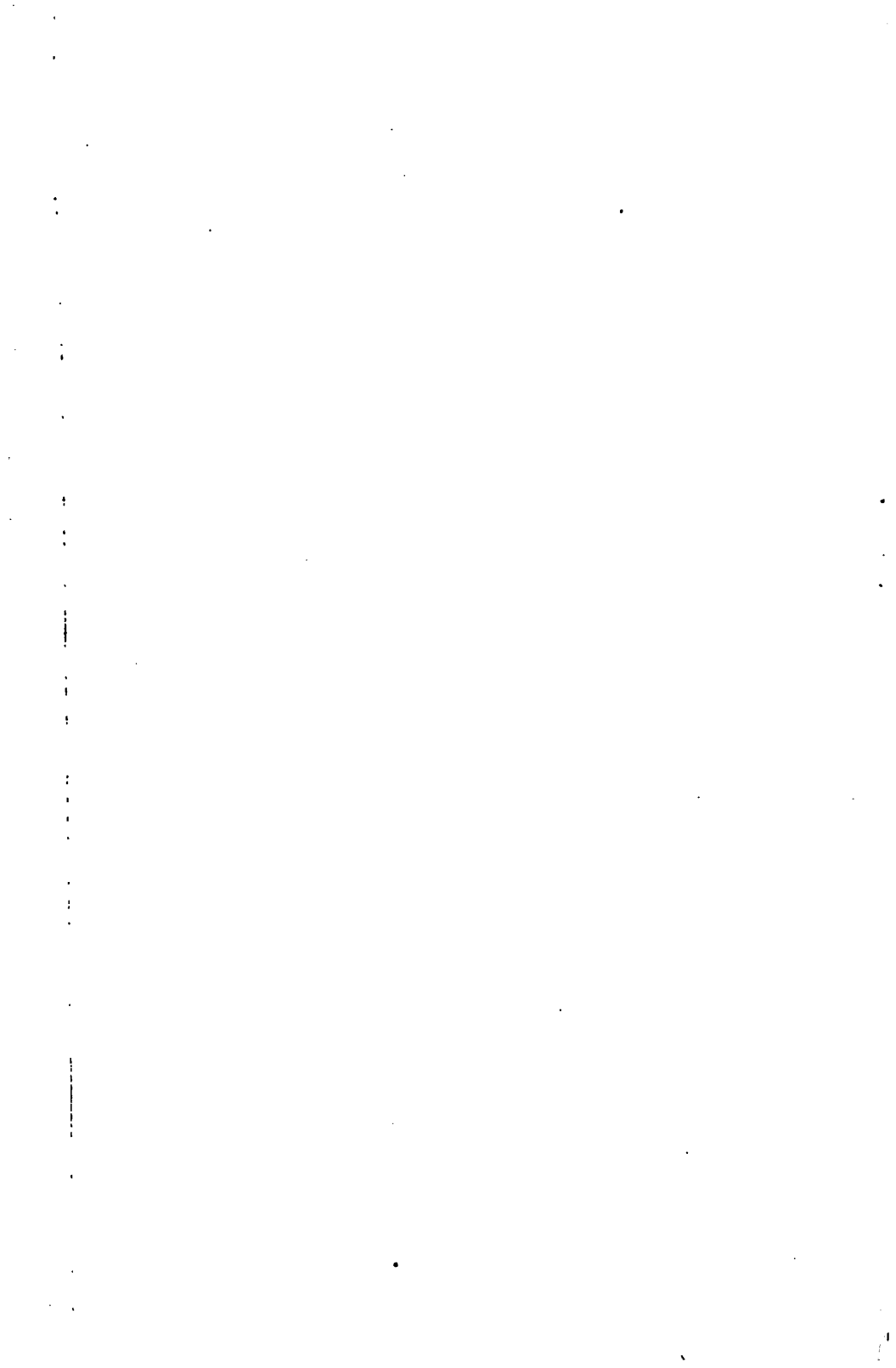
The subject is shown in table herewith and presented in detail in the appended reports of the Division Engineers, pp. 231, 309 and 358.

Those roads which have been completed have given unqualified satisfaction to the people who have used them and who have helped to pay for them, and in nearly every case the immediate result has been the presentation of petitions for the extension of the roads so built.



WESTCHESTER COUNTY, N. Y.: BRIARCLIFF-ECHO LAKE ROAD, No. 54.
Showing improvement by State Engineer September 18, 1902. Quarry of granitic rock, with crusher and screens on left and road in foreground.
Top and base of this rock; base bound with its screenings and top bound with this and limestone screenings.





During 1899 there was built in Columbia county a gravel road which has given entire satisfaction and which cost much less than a macadam road would have cost.

During 1901, an earth road 3 miles long was built in Rensselaer county, using the best available material along the line and properly forming and draining it, at a cost of \$3,391 per mile with the result of fully suiting the local needs.

During 1901, 32 miles of earth roads were begun in Orange county and were completed in 1902 at an actual contract cost of \$2,134 per mile. These have since been covered with gravel and hard shale at the expense of the Orange County Construction Company, and pictures are here given showing their condition after 18 months use.

During 1902, 26½ miles of roads were begun in Orange county which are to be completed at an average cost of \$5,581 per mile, being formed of the best available shale and gravel.

The hard shales thus used in Orange county are entirely different in character and durability from the soft shales of the central and western parts of the State, and will give good results for a limited time of which the period is yet to be determined, but which will be less than the life of a macadamized road formed of harder stone broken in a crusher, and costing more.

The Orange county shales thus used require blasting with 30 per cent. dynamite to quarry them, but they do not require the use of a crusher, being broken and compacted upon the road by wheels of a 10-ton steam-roller. Shales which are too hard to be thus broken are not used, it being better economy to apply the cost of crushing, when crushing is necessary, to the more durable rocks which exist in many places in Orange county, as has been determined by a special examination of the county made for this department by the expert geologist below mentioned.

In various parts of the State from which petitions have been received, examinations have been made to determine the character and extent of the local supplies of gravel, of field-stones

or of ledge rock. In this manner the vicinities of 54 proposed roads, representing 161½ miles in length, have been examined and descriptions and samples of the materials have been filed in this office for future reference. The report of Special Examiner Frank D. Lyon, gives at page 194 these and other practical results which were thus obtained. In a number of cases where the geologic formations were not plain, the services of an expert geologist have been employed, and the resulting valuable reports of Mr. Gilbert Van Ingen are on file for reference.

There have been many calls from different parts of the State for roads of a cheaper character, like those which are described in Rensselaer and Orange counties, and which will give satisfactory results where heavy traffic does not occur and where the people do not wish to build the high-class and more costly macadam roads, but who desire to avail themselves of the liberal provisions of the "Good Roads" Law.

In such cases the State Engineer acts under the provisions of section 4 of chapter 115 of the Laws of 1898, using his discretion, selecting for the improvement of any highway, a Telford, macadam, or gravel roadway, or other suitable construction, "taking into consideration climate, soil and materials to be had in the vicinity and the extent and nature of the traffic likely to be upon the highway, specifying in his judgment the kind of road which a wise economy demands."

Acting under these provisions the estimates and specifications have, in many cases, provided for the use of local stone; sometimes using the best ledges to be found in that vicinity and in other cases using selected field-stone, and in still other cases where local conditions demanded cheaper roads, they have been formed of the best local soils and gravels, which have been spread and rolled upon the roadway after properly clearing it of sod and of stones, and forming it with the ditches and culverts necessary for perfect drainage. In such cases the improved roads thus made will be vastly better than any former condition of these highways, draining themselves much quicker and being less subject to washouts and injuries by high water.



ORANGE COUNTY, N. Y.: COCHECTON ROAD No. 43, NEWBURG TO MONTGOMERY.
Showing typical ledge of best quality of local shale used.

Roads thus made will not be "macadam roads," but their cost will be less than one-third of the cost of macadam roads, or say \$2,000 to \$3,000 per mile, varying with the amount of grading and the number of culverts which may be needed.

If the local authorities and the people who use these roads should later desire to make macadam roads upon them, the grading and ditching and forming which have been done will be so much accomplished towards forming a high-class road, and by this means many of the rural counties of the State may gradually obtain the full benefit of State Aid for the improvement of their highways.

WIDE TIRES.

Wide tires are used on wagons intended to carry heavy loads wherever the people know the effects and appreciate the benefits which result from using tires which improve roads instead of destroying roads. There is no case on record where a community which has seen the benefit of using wide tires has reverted to the use of narrow tires.

The Agricultural Experiment Station of the University of the State of Missouri, in Bulletin No. 39, gives a very exhaustive discussion of the influence of the width of tires on draft of wagons, with details of tests on all kinds of roads, on meadows, pastures, stubble and plowed lands, with cuts showing the roads as they appeared after the tests were made, and giving as a conclusion an advantage varying with different conditions from 17 per cent. to 120 per cent. in favor of wide tires.

The United States Department of Agriculture, in Bulletin No. 12, gives a synopsis of the laws of various States in the Union and in foreign countries in relation to the use of wide tires, together with varied descriptions of thorough tests which have been made and of the results of these tests which show conclusively the advantages of wide tires to the general public as a road improver and to the individual user as a money saver.

Recognizing these facts, a law was passed in 1899, being chapter 155, which empowers boards of supervisors to enact local

laws relating to the width of tires used on vehicles built to carry a weight of 1500 pounds and upwards and to provide penalties for the violation thereof. Such laws have been enacted by several counties as well as by numerous towns and cities, and penalties have been prescribed for violations, the fines collected being devoted to the highway funds of the towns in which the offense is committed.

Copies of some of these laws are given at page 113.

TESTS OF ROAD MATERIAL.

It has been found desirable to make comparative tests of the wearing qualities of the various rocks found near proposed roads in different parts of the State in order to determine which of them are best adapted to the purpose. Much of the stone throughout New York State is entirely unsuited for permanent road building, some of the limestone being too soft for the purpose, while much of the sandstone is much too brittle and friable and has no binding properties. In order to compare the various rocks, this Department has found it most advantageous to obtain the co-operation of the engineering department of Columbia University, where there is installed a complete outfit of the latest improved devices for testing crushed stone by abrasion of the fragments and by cementation of the dust resulting therefrom.

William H. Burr, M. Am. Soc. C. E. and professor of civil engineering in Columbia University, has taken much interest in the subject and has given this Department the full benefit of this outfit, as well as of his personal supervision, and also of the services of Adolph Black, civil engineer, instructor, who has had direct charge of these tests, with the results which are here shown.

The apparatus and the methods which are used in making these tests are identical with those used in making similar tests for the Massachusetts Highway Commission, the results of which are published in the report of the commission for 1900,



ORANGE COUNTY, N. Y.: GOSHEN-FLORIDA ROAD, No. 44

Gravel road built by State Engineer in 1901 (using gravel from pit on old road, half mile east).
Condition August 20, 1902, after one year's use without repairs.



ORANGE COUNTY, N. Y.: COCHECTON ROAD No. 43, NEWBURG TO MONTGOMERY.

Showing typical shale road after rolling and two months' traffic; side road on left shows similar shale before rolling. Improved by State Engineer during 1902. August 20, 1902.

and also with those used by the office of Public Road Inquiries of the U. S. Department of Agriculture at Washington.

The stone to be tested consists of selected fragments, each of which is nearly cubical in form, none having a less dimension than $1\frac{1}{4}$ inches nor a greater dimension than $2\frac{1}{2}$ inches measured through the corners on the longest line of the fragment. All fragments are rejected which have thin sharp edges which will easily break off. Five kilograms or 11 pounds of these selected fragments are thoroughly cleaned, washed and dried before being tested. In making the test for abrasion the machine used is a modification of the original Deval machine, which was first exhibited at the Paris Exposition of 1878. The present machine consists of four hollow cast iron cylinders each 20 cm. (7.9 inches) in diameter and 34 cm. (13.4 inches) in depth. Each cylinder is closed at one end and has a tight-fitting iron cover for the other end. The four cylinders are fastened to a shaft so that the axis of each cylinder is at an angle of 30 degrees with the axis of the rotation of the shaft. The charge of stone for each cylinder is weighed with minute accuracy to be 5 kilograms or 11 pounds. The covers are secured to each cylinder, and the whole is then rotated at a uniform rate of about 2,000 revolutions per hour for five hours or until an automatic recorder shows 10,000 revolutions. By this means the fragments of stone within each cylinder are thrown back and forth and are abraded against the sides and ends of the cylinders and against each other, with the result of giving to each different set of samples precisely the same amount of abrasion. After 10,000 revolutions the machine is stopped, the cylinders are opened and the contents of each are placed on a sieve of 1-16-inch mesh. The material which passes through this sieve is put aside for the cementation test. The sieve and the remaining fragments of stone are then held under running water until all the adhering dust is washed off. The remaining fragments are then thoroughly dried and carefully weighed, and the difference between this weight and the original 5 kilograms or 11 pounds shows the amount worn off during the test.

The percentage which this 1-16-inch dust bears to the original weight may be taken as the basis of comparison, or the French coefficient of wear may be determined by the formula which is based upon the fact that only the best varieties of rock show a wear of less than 20 grammes per kilogram or 2 per cent. of the original weight. This formula is as follows:

$$\text{Coefficient of wear} = 20 \times \frac{20}{W} = \frac{400}{W}$$

in which W is the weight in grammes of dust less than 1-16-inch per kilogram or per 2.2 pounds of rock used.

The cementation test is then made from the material which has passed through the 1-16-inch mesh. This material is screened with a sieve having 100 meshes per inch, and the resulting dust is made into briquetts 25 mm. or .98 inch in diameter and the same in height by moistening the dust with distilled water, placing the moistened dust in a metal dye of the above named dimensions; a closely fitting plug is then inserted on top of the moist dust and subjected to a pressure of 100 kilograms per sq. cm., or 1,422 pounds per square inch. Five briquetts are usually made from each sample, and the briquetts are then allowed to dry in a temperature of 60 degrees to 70 degrees for about two weeks. A specially devised machine is then used to test the strength of these briquetts by automatically dropping a hammer weighing one kilogram or 2.2 pounds a distance of one cm. or .39 inch. This machine being a miniature automatic pile driver, which lifts the hammer exactly the distance for which it is set, records the number of blows and indicates when the bond of cementation is broken.

The results of these tests is given in each case as the average of the several tests made for each specimen.

For purposes of comparison these are followed by the results of similar tests made by the Massachusetts highway commission of ten specimens of diabase (trap) as published in their annual report for 1900.

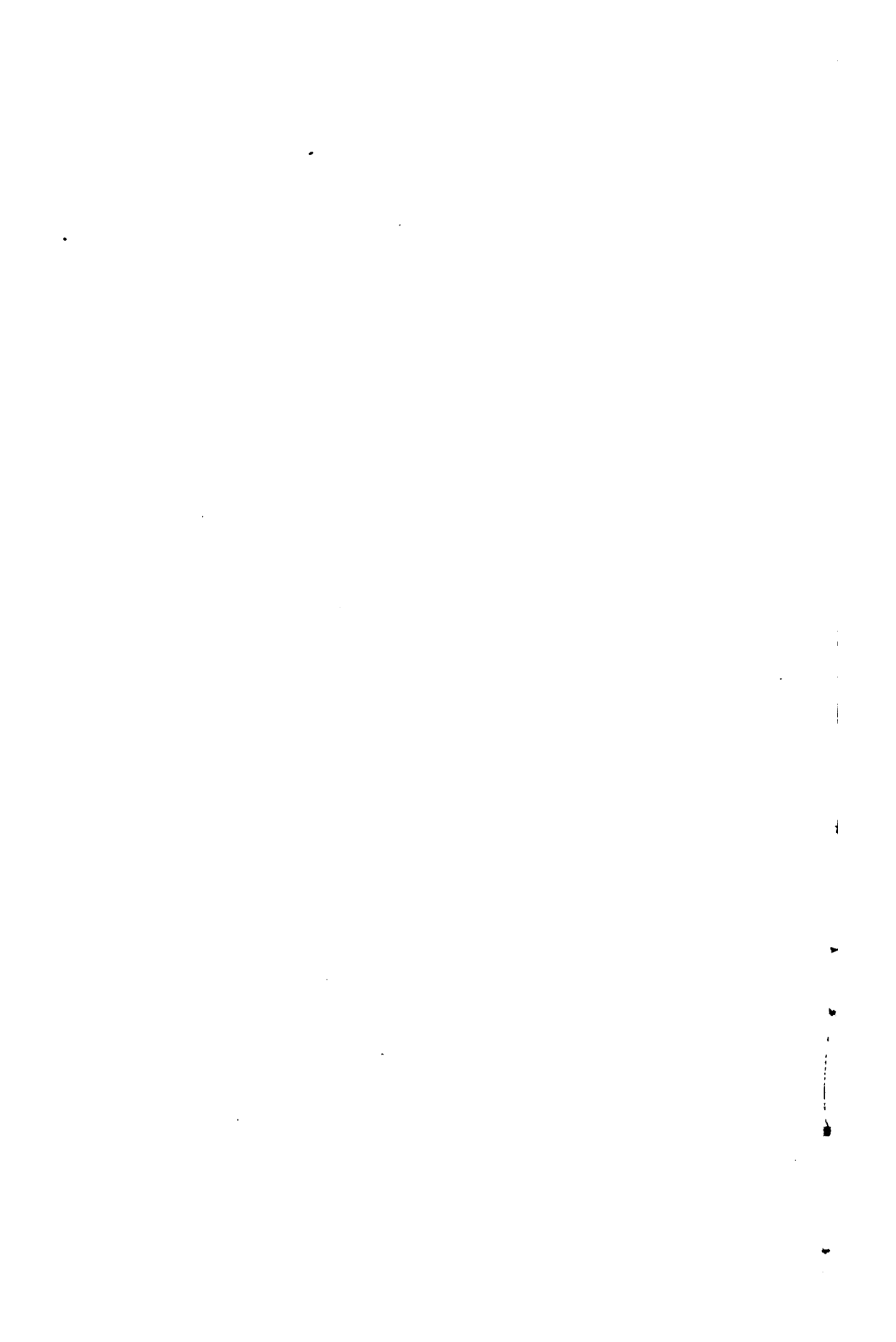


In rock cutting, partially rolled.



In earth cutting, after rolling and before effect of traffic.

ORANGE COUNTY, N. Y.: COCHECTON ROAD NO. 43, NEWBURG TO MONTGOMERY.
Shale road in progress of improvement by State Engineer August 20, 1902.



TESTS OF ROAD MATERIAL.

17

| LOCALITY OF QUARRY. | Name of rock. | WEAR. | | Cemen-
tation
value. | Where used. |
|--|---|--------------------|--------------|----------------------------|---|
| | | Co-effi-
cient. | Per
cent. | | |
| <i>Dutchess County, N. Y.</i>
Clinton Point, near Pough-
keepsle..... | Gray limestone | 13.80 | 2.90 | 39 | Used for base of 9 miles of roads in Eastern New York, built by the State in 1899 and 1900, and also for base and top of many roads in vicinity of New York city. |
| <i>Herkimer County, N. Y.</i>
Little Falls, Herkimer county.
Moss Island Mohawk river. | Hornblendic gneiss | 5.16 | 2.64 | 10 | Used for base and top of 1 mile of Frankfort and Utica road, built by State in 1900. |
| <i>Monroe County, N. Y.</i>
Glacial drift field stone, near Rochester, Monroe county.. | Red sandstone..... | 9.03 | 4.43 | 16 | Used for base of Little Ridge road west from Rochester 6 miles, built by State during 1899 and 1900. |
| Glacial drift field stone, near Rochester, Monroe county.. | White sandstone... | 11.05 | 3.62 | 24 | |
| Rochester, Monroe county.
N. Y., Goodman street quar-
ries of Foery & Kastner | Niagara gray lime-
stone..... | 7.22 | 5.54 | 42 | Used during 1902 for base and top and filler of section 1, Webster road, No. 98, 1 1/2 miles from Clifford street, Rochester, to Irondequoit creek, Monroe county, N. Y., built by the State. |
| <i>Onondaga County, N. Y.</i>
Seneca Clark Quarry, 12 miles south of Syracuse, near La-
fayette, Onondaga county,
N. Y. | Gray sandstone ... | 5.97 | 6.69 | 68 | Used for base of 2 miles of James st. and Cortland street roads, near Syracuse, built by State in 1899 and 1900. |
| National Wall Plaster Co.,
Jamesville, Onondaga Co.,
N. Y. | Limestone | 10.95 | 3.65 | 15 | |
| Alvord Quarries, near east
line of town of Onondaga,
Onondaga county..... | Blue limestone..... | 9.14 | 4.88 | 89 | |
| Split Rock Quarries Solvay
Process Co., town of On-
ondaga, also Indian quar-
ries, on N. E. part Onon-
dago Reservation, also
Jamesville Quarries near
Penitentiary of Onondaga
county, N. Y. | Gray limestone. ... | 6.20 | 6.45 | 22 | |
| Indian Quarries, overlying
the gray, on N. E. part On-
ondaga Reservation | Blue limestone.... | 5.99 | 6.68 | 83 | |
| <i>Erie County, N. Y.</i>
Buffalo Cement Co. Quar-
ries, in north part of city
of Buffalo | Buffalo Plains lime-
stone, with little
embedded flint... | 8.29 | 4.82 | 67 | Used for base and top of 33 miles of 16-foot roadways in ten cities and towns of Western New York during years 1893 to 1900; used for base of 6 miles of State road near Buffalo. |
| | Buffalo Plains lime-
stone, with much
embedded flint... | 9.66 | 4.14 | 94 | |
| <i>Ulster County, N. Y.</i>
Bluestone Quarry, near Phoe-
nicia, Ulster county, N. Y..
Water-worn stones from bed
of Esopus creek, near Phoe-
nicia, Ulster county, N. Y.
(similar to the quarry
stones) | Blue sandstone | 11.17 | 3.58 | 39 | Used for base and top of 10 miles of Ulster and Delaware road, built near Phoenicia by State in 1900 and 1901. |
| Smith & Post Quarry West
Catskill, N. Y. | Blue sandstone .. | 10.42 | 3.84 | 11 | |
| | Sandstone, Esopus
grit. | 8.52 | 4.69 | 60 | |

| LOCALITY OF QUARRY. | Name of rock. | WEAR. | | Cementation value. | Where used. |
|--|--|---------------|-----------|--------------------|---|
| | | Co-eff. cent. | Per cent. | | |
| Turtle Pond Quarry, Kaaterskill, N. Y. | Shaley gray New Scotland limestone | 10.09 | 3.96 | 68 | Used during 1901 for base of 1 mile of Orchard Park Road, Erie Co., and for base of 1 mile of Pittsford road, and of 1½ miles of Fairport road in Monroe Co., and for filler for several other roads built by State. |
| Holdridge Quarry, Kaaterskill, N. Y. | Becraft reddish gray crystalline limestone | 7.61 | 5.25 | 56 | |
| Genesee County, N. Y.
LeRoy, Genesee county, N. Y., N. B. Keeney & Son's quarries | Onondaga gray limestone | 10.87 | 3.68 | 21 | |
| Ditto | Onondaga gray limestone | 11.04 | 3.63 | 15 | |
| Ditto | Onondaga gray limestone | 10.70 | 3.74 | 21 | |
| Madison County, N. Y.
Perryville, Madison county, N. Y., (Cyrus Warlock's quarries, on Canastota branch of the Lehigh Valley R. R. | Onondaga gray limestone | 7.99 | 5.00 | 24 | Used during 1901 for base and top and filler of half mile of road built by State at Truxton, Corl'd Co.
Used during 1901 for base and top and filler of ¾ mile of Plattsburgh and Keeseville road built by State.
Used during 1901 for base and top and filler of 2½ miles of Plattsburgh and Keeseville road built by State.
Used during 1902 for base and top and filler (with sand) of 1¼ miles Delmar and Slingerland road No. 92 and for part of base and for top and filler of 1¼ miles of North road No. 134, both built in Albany county by the State. |
| Clinton County, N. Y.
Plattsburgh, Clinton county, N. Y., Moore's Quarry, north side of village | Clinton blue limestone | 6.87 | 5.82 | 11 | |
| Five miles south of Plattsburgh, N. Y., quarry on north bank of Salmon river | Clinton gray limestone | 10.94 | 3.66 | 25 | |
| Schoharie County, N. Y.
Schoharie, Schoharie county, N. Y., quarries of Riley & Mix | Lower Helderberg blue limestone | 9.00 | 4.45 | 40 | |
| Yates County, N. Y.
Dresden, Yates county, N. Y., quarries of Seneca Lake Broken Stone Co., producing naturally fractured stone | Hamilton gray limestone | 6.99 | 5.76 | 26 | |
| Rockland County, N. Y.
Rockland Lake, N. Y., quarries of Rockland Lake Trap Rock Co., (Conklin & Foss), opposite Sing Sing, on the Hudson river | Dabase (trap) coarse | 14.62 | 2.74 | 35 | Used during 1900 and 1901 for top of 2 miles and for base and top of 1 mile of Loudonville road, built by State, north from Albany.
Used during 1901 for base of 3¼ miles of Glens Falls and Saratoga road, built by State, south from Glens Falls.
Top of ditto. |
| Saratoga County, N. Y.
Six miles S. W. of Glens Falls, N. Y., Slade's Quarry—from north end of quarry | Gray and black granite | 9.30 | 4.80 | 7 | |
| Ditto, from center of quarry | Gray granite | 10.88 | 3.68 | 8 | |
| New Jersey Rocks.
Millington, N. J., quarries of Morris County Crushed Stone Co. | Basalt (trap) | 18.57 | 2.15 | | Used during 1895-1901 for 50 miles of roads in Morris, Somerset and Union counties, New Jersey. |



Condition, April 1, 1902.



In progress, June 20, 1902.



Completed, July 23, 1902.

RENSSELAER COUNTY, N.Y.: TROY AND BRUNSWICK ROAD, No. 25, NORTHEAST FROM TROY, N.Y.

Showing improvement by State Engineer during 1902. Base and top of crushed local quartzite; base bound with screenings of same and top bound with screenings of Canajoharie limestone.

TESTS OF ROAD MATERIAL.

19

| LOCALITY OF QUARRY. | Name of rock. | WEAR. | | Cementation value | Where used. |
|---|--|----------------|-----------|-------------------|--|
| | | Co-eff. cient. | Per cent. | | |
| Bound Brook, N. J., quarries of Bound Brook Crushed Stone Co..... | Basalt (trap) | 19.27 | 2.08 | ... | Used for roads in vicinity of Bound Brook, Somerville and New Brunswick, New Jersey. |
| Great Notch, N. J., quarries of Francisco Brothers | Basalt (trap) | 16.00 | 2.59 | 205 | Used during 1902 for top of 2 miles of Lestershire road, No. 125, Broome county, N. Y., built by the State. |
| Westchester County, N. Y.
On east side of Kensico reservoir at roadside. . . . | Gray quartzite | 11.13 | 3.59 | 9 | Used during 1900 and 1901 for base of 3½ miles of White Plains and Armonk road, built by State. |
| Near Elmsford N. Y., spoil-bank of shaft No. 12 excavated from Croton Aqueduct tunnel in 1888. | Quartzite | 6.77 | 5.90 | 15 | Used during 1900 and 1901 for base of Saw-mill River road, built by State. |
| One-half mile north of East View, N. Y., Rockefeller Quarry, at roadside. | Dark gray granitic rock. | 10.06 | 3.98 | 10 | Used during 1901 for base of roads north and south from East-view, built by State. |
| Two miles west from Bedford, ledge at Light's farm | Pink and gray gneiss | 8.64 | 4.63 | 12 | Used during 1901 for base of 2 miles of road between Mt. Kisco and Bedford, built by State. |
| Chemung County, N. Y.
Wells Quarry, 3 miles west of Elmira, N. Y. | Chemung grit. | 5.82 | 6.88 | 24 | Used during 1901 for base of 8½ miles of the Southport road to the south boundary of New York State, built by State. |
| Chenango County, N. Y.
From ledge 5 miles north of Norwich, on farm of Loren Cushman, 300 feet west of Norwich and Plymouth road No. 112 | Sandstone | 6.80 | 5.88 | 26 | Used during 1902 for base top 2 miles of Norwich and Plymouth road, No. 112, built by State. |
| Cortland County, N. Y.
From ledge on farm of O. G. Kellogg, 2½ miles S. E. from Cortland, N. Y. | Calcareous sandstone | 7.07 | 5.65 | 30 | Used during 1902 for base of 1 mile of road south from Cortland, Blodgett's Mills road, No. 111, built by State. |
| Albany County, N. Y.
Quarries ¼ mile north from Dunsbach Ferry station on N. Y. C. & H. R. R. on S side of Mohawk river. | Hudson river sandstone | 6.78 | 5.96 | 50 | Proposed for top and base of section 2 of London road, No. 119, from Albany to Cohoes, to be built during 1903 by the State. |
| Montgomery County, N. Y.
Quarry on north side of Mohawk river, near Yosta, Montgomery county, N. Y. . . | Calcareous sandstone | 6.42 | 6.23 | 11 | |
| Oneida County, N. Y.
Two miles S. E. of Utica, N. Y., from Seaton Quarry Oneida county, N. Y. | Red and yellow sandstone, loose-grained | 6.57 | 6.09 | 8 | |
| Ditto | Gray sandstone and quartz conglomerate, close-grained. | 7.04 | 5.68 | 12 | |
| Franklin Iron Works, Kirkland, Oneida county. | Slag | 2.73 | 14.63 | 23 | |

TEN RECORDS OF TESTS OF TRAP ROCK, FROM REPORT OF
MASSACHUSETTS HIGHWAY COMMISSION, 1900.

| LOCALITY OF QUARRY. | Name of rock. | WEAR. | | Cemen-
tation
value. | Where used. |
|---|---------------------------------|-------------------|--------------|----------------------------|-------------|
| | | Co-eff-
cient. | Per
cent. | | |
| Amherst, Mass. | Diabase (trap)..... | 20.33 | 1.97 | 62 | |
| Beverly, Mass. | Diabase (trap)..... | 16.71 | 2.39 | 14 | |
| Boundbrook, N. J. | Basalt (trap)..... | 18.61 | 2.15 | 16 | |
| Byram Station, N. J. | Basalt (trap)..... | 26.93 | 1.49 | 31 | |
| Great Notch, N. J. | Diabase (trap)..... | 18.59 | 2.15 | 36 | |
| Rockland Lake, N. Y. (oppo-
site Sing Sing)..... | Diabase course (trap) | 17.79 | 2.25 | 13 | |
| Lynn. | Diabase (trap)..... | 15.49 | 2.58 | 28 | |
| Meriden, Conn. | Diabase (trap)..... | 22.77 | 1.75 | 34 | |
| Milton, Mass. | Diabase (trap)..... | 22.14 | 1.81 | 17 | |
| West Springfield, Mass. | Diabase porphyry
(trap)..... | 19.64 | 2.04 | 53 | |
| Millington, N. J. | Trap..... | | | | |
| Averages..... | | 19.91 | 2.06 | 30 | |

PRISON LABOR FOR HIGHWAY IMPROVEMENT.

It is generally agreed that convicts should be usefully employed rather than kept in injurious idleness, and various attempts have been made with varying success to thus employ a small portion of the 1,500 men who are now confined in the county jails, which are sought by the idle and vicious class as welcome retreats where they can be cared for at the expense of the taxpayers. The actual value of such services varies widely with the manner in which they are directed, and it does not appear that satisfactory results have as yet been obtained in this State.

For the employment of the State prisoners no better suggestion can now be offered than to repeat what was said on this subject in all of my previous annual reports.

The principal formation of trap-rock in New York State exists in Rockland county just across the Hudson river from Sing Sing prison, where a large number of convicts are confined in idleness, which is injurious to them and expensive to the State. It would seem practicable that the State should open a quarry in the trap-rock formation near Sing Sing, where the picturesque features of the Palisades should in no wise be



ORANGE COUNTY, N. Y.: FLORIDA-WARWICK ROAD, No. 93.
Showing shale cutting on new location avoiding hill

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affected by it, and should equip this quarry with stone-crushing machinery. The convicts could here be confined as securely as in Sing Sing, and the crushed rock delivered at the wharf on the Hudson river, or on cars on the railroad, at about one-third the price now charged by private quarries along the Hudson river in New Jersey. Contracts for highway improvement could be let with the stipulation that the contractor could obtain the necessary stone at a certain fixed price per cubic yard at the State wharf, where it could be loaded onto canal boats or cars for transportation to any part of the State.

For such localities as could only be reached by railroad transportation, special freight rates could doubtless be arranged with railroad companies, since railroads profit directly by the improvement in highways, all of which are direct tributaries to the railroads and bring to them business which is created by the existence of good highways.

The question of the profitable employment of convict labor in building roads has received much attention, and many discussions for and against it have been printed. Such an arrangement as is here suggested seems to avoid the objections, since the prisoners can be confined as closely as within the walls of Sing Sing prison, and when working will not compete in any way with organized labor.

SUPERVISORS' CONVENTION.

In order to enable representatives of the various counties to discuss the subject of highway improvement by State aid, the State Engineer sent invitations to all of the counties of the State, with the result that a convention was held in the city of Albany on January 28 and 29, 1902, at which convention there were assembled 216 delegates from 42 counties.

In the circular calling the convention, the State Engineer specially requested that representatives should be sent who should express the feeling of their counties whether for or against the improvement of highways by State aid. The meeting was a most successful one, and resulted in the adoption of

a resolution requesting the Legislature to appropriate one million dollars to carry out the provisions of the Higbie-Armstrong Law; also favoring the money system of highway taxes and the employment of convict labor and the bonding of the State for \$20,000,000 for highway improvements.

The proceedings of this convention, which included five valuable papers specially prepared by prominent engineers and road experts, were published at Washington in pamphlet form with many illustrations by the U. S. Department of Agriculture as Public Road Inquiries Bulletin No. 22, and have been widely circulated throughout the United States and they are here given at pp. 118-193 of this report.

A similar convention will be held in Albany during January 20 and 21, 1903.

During the year the State Engineer and the Deputy State Engineer have made numerous speeches at various places in the State for the purpose of explaining the operations of the law of highway improvement by State aid.

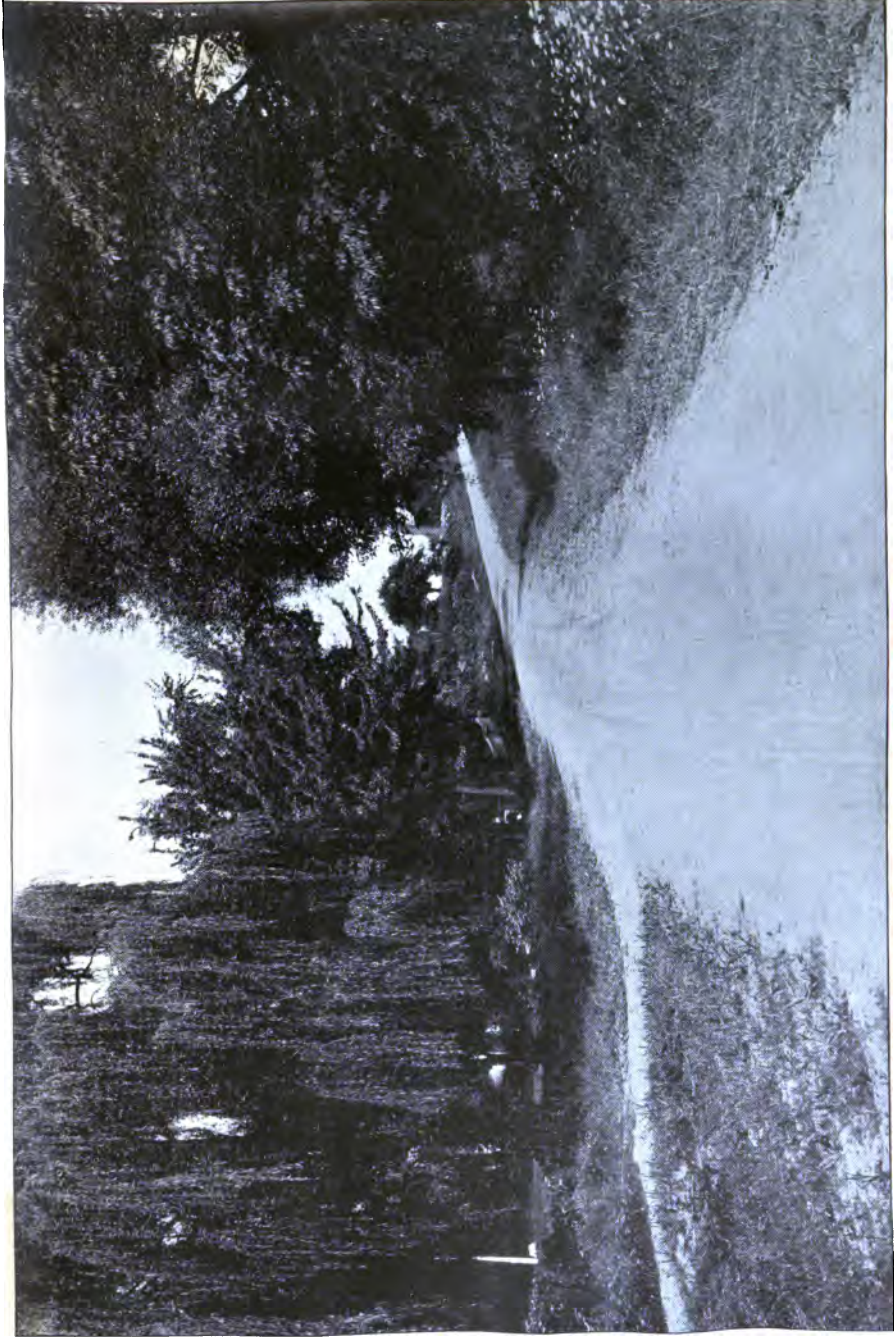
It is recommended that the Legislature should enact a law enabling the State Engineer to close any road during the progress of its improvement.

There are printed at pp. 103-109 of this report copies of the Highway Improvement Law, with its amendments up to date of issue of this report, and also a copy of the Fuller Law as amended; also a copy of the Wide Tire Law, and a presentation of the facts regarding the effects of the use of wide tires at pp. 110-112.

The State Engineer recommends that the Legislature shall appropriate not less than \$2,000,000 for highway improvement in order that the roads may be improved for which plans and estimates have already been approved by the various counties of the State.

SUGGESTED BONDING SYSTEM.

While great progress has been made in the work of improving our public highways, it has been suggested that some method



ORANGE COUNTY, N. Y.: NEWBURG TO MONTGOMERY ROAD, No. 43
Shale road, built by State Engineer in 1901. Condition, at Silver Stream avenue, August 20, 1902, after one year of use without repairs

should now be adopted by which a system could be put in operation for the purpose of improving within a very few years such a part of the principal roads in the State as would be of most benefit to the greatest number of citizens, and that this improvement should be conducted in a more expeditious manner than is now possible. To do this would require a larger annual expenditure on the part of the State than has yet been made, and if paid at one time would impose a larger burden upon the State than it would be wise to inflict in one, two or even five years. The work which is being done is not only for the present, but for all time; and many, therefore, advocate an issue of State bonds for the purpose of improving our public highways under the provisions of the present State Aid Act, claiming that this would fulfill two important requirements, first, there would be immediately available a sufficient sum to provide for the improvement within the next three or four years of a large proportion of the principal roads which are worthy of improvement, and, secondly, it would distribute the cost of such improvement over a term of years, making the annual payment so small as to be scarcely perceptible and allowing those who would benefit by the work in the future an opportunity to help pay for its construction.

The funds derived from the sale of these bonds could be used for the purpose of paying the total cost of improvement of highways and the counties' share could be returned to the State in payments extending over a term of years equal to that over which the bonds extended.

Our State has fifty thousand square miles of area and outside of Greater New York city, which covers 4 counties, we have 57 counties which comprise 929 townships. In these are located substantially 75,600 miles of highways. From a careful study of the highways, it has been found that about 10 per cent. of the whole amount are important thoroughfares which should receive prompt improvement under State aid and it would take substantially sixty millions of dollars to pay for the whole construction of this 10 per cent., which equals, say, 7,500 miles. If the State would issue, as soon as the change of the Constitution

would permit, a series of bonds amounting to fifty millions of dollars at 3 per cent. annual interest, free from State tax, running for fifty years, no doubt these bonds could be easily disposed of at par and in addition to the money already expended for the improvement of highways of the State under the Higbie-Armstrong Act and the amounts of money that in all probability will be thus expended between now and the time intervening for the change of the Constitution would supply sufficient funds to permanently and thoroughly construct one-tenth of the roads within our State.

As pointed out in my last annual report, 1,250 miles of highway would connect the county seats of all the counties of the State outside of the Adirondack and Catskill mountain districts. The 10 per cent. of the roads herein mentioned would give us six times the miles of road that would be required to connect the county seats as above mentioned, and would give each county and each town some road at the points most needed, so that the general public would then know of the benefits to be derived from this construction and would be enabled to judge whether they would go further with it or adopt some other method. Wherever we have constructed roads of this character in any portion of the State they have received such universal approval that the inhabitants of the particular sections where the roads are constructed are desirous of having more of them at the earliest time possible.

Our State has substantially one-tenth of the population of the whole United States, which equals, in round numbers, for our State, 7,300,000. If the State was cut up into farms and assuming that the population of the State was grouped in families of five, it would only give a farm of 22 acres of land to each family, including all the waste land of the State, which would be a parcel of land less than 1,000 feet square for each family.

It is conceded by all who make a study of the farming interests of our State, that we are not receiving the benefits of the farms that they are capable of producing, but it is not impossible, in fact it is quite probable, that with the rapid increase in the construction of trolley lines through the various sections of the State and the improved method of road con-



Condition June 1, 1902.
Looking south to the south end of road.



Condition June 1, 1902.
Looking north from about middle of road.

BROOME COUNTY, N. Y. : CHENANGO RIVER ROAD, No 47, NORTH FROM BINGHAMTON.

Along west side [of Chenango river, 1½ miles, as improved [by State Engineer in 1901. Base of crushed local field-stone bound with screenings of same. Top of crushed; hard limestone, bound with limestone screenings. 16 feet width of macadam.

struction, that within the next few years the whole system of caring for the farms and the families seeking a permanent home in country districts is quite liable to revolutionize the present depressed condition of the farms and to make the country home the most desirable.

If this method of obtaining money for the construction of roads is adopted it will first permit of the State furnishing its proportion of the funds without a direct State tax and would make the county, town and individual assessments so light that the tax would be almost imperceptible, in fact, it is believed by many that the increased valuation of assessments on the farm properties of the State would raise the necessary amount of money to wholly pay for the roads herein outlined. This matter will be brought to the attention of the forthcoming Fourth Annual Supervisors' Highway Convention, to be held in Albany, January 20th and 21st, 1903.

CEMENT TESTING FOR STATE AND MUNICIPAL WORKS.

All hydraulic cement intended for use in the masonry of the various State works has been tested in the laboratory of this Department, and no cement is used which does not meet the requirements. The effect of these tests is not only to prevent the use of poor cement but also to induce sending only the best grades to the State works, where it is known that the cement will be subjected to tests provided by this Department.

The grade of these requirements is to be raised January 1, 1903, in order to keep up with the improved methods and products of American manufacturers of Portland cements, and as shown in the following extract from the standard specifications of this Department.

Requirements Hydraulic cement. American Portland cement or American Natural cement, as may be specified, shall be used and shall be of a brand known by prior use on extensive works to be of the best quality. Any cement not so known may be declined without testing.

Storing. Provision shall be made by the contractor for storing cement in a dry place and delivery shall not be made until the State Engineer has been notified to inspect the cement and to take samples for which all facilities shall be offered by the contractor. The contractor shall replace at his own cost any cement which may be damaged while stored.

Samples. Samples will be taken by the Engineer at once on delivery, from every tenth barrel or the equivalent of the tenth barrel if the cement is packed in sacks, and will be numbered consecutively throughout the progress of the work; each separate sample shall fill a three-inch cubical box, and each lot of samples shall be forwarded by express to Albany for separate tests, the results of which may be expected in ten days.

Tests. These tests will follow the practice recommended by the American Society of Civil Engineers and will be: 1st, for fineness; 2d, for soundness; 3d, for time of initial set; 4th, for tensile strength; 5th, for composition by chemical tests.

Required fineness. Cement shall be ground to such fineness that 97 per cent. by weight will pass through a standard sieve of 2,500 meshes per square inch, and 92 per cent. by weight will pass through a standard sieve of 10,000 meshes per square inch.

Soundness. The cement shall endure the hot water test at 125 degrees Fahr. for 24 hours without cracking or blowing.

Chemical tests. The State Engineer may cause chemical tests of cement to be made, and may reject any cement which, in his judgment, is not suited to the purpose.

Initial set. Neat cement shall not set to support one-quarter pound weight on one-twelfth inch wire in less than 20 minutes for natural cement and 30 minutes for Portland cement.

Required strength—American Portland cement. Briquettes of neat cement mixed 3 minutes, put in the moulds with thumbs and trowel, and kept at a temperature of 65 to 70 degrees for 1 day in moist air and 6 days in water shall show a least average tensile strength of 400 pounds per square inch.

Briquettes of three parts by weight of standard crushed quartz and one part by weight of Portland cement [mixed in the same manner and kept seven days under the same conditions shall show a least average tensile strength of 140 pounds per square inch.

Briquettes of three parts by weight of standard crushed quartz and one part by weight of Portland cement, mixed in the same manner and kept 28 days under the same conditions, shall show a least average tensile strength of 220 pounds per square inch.

Required strength—American natural cement. Briquettes of neat natural cement mixed 3 minutes, put in the moulds with thumbs and trowel and kept at a temperature of 65 to 70 degrees for 2 hours in moist air and 22 hours in water, shall show a least average tensile strength of 60 pounds per square inch.

Briquettes of natural cement and standard crushed quartz in equal parts, by weight, mixed and handled in the same manner and kept at the same temperature for 1 day in moist air and 6 days in water shall show a least average tensile strength of 65 pounds per square inch.

Briquettes similar to those last described and kept 28 days under the same conditions, shall show a least average tensile strength of 150 pounds per square inch.



In progress, on new location near Echo Lake, September 20, 1902.



Finished road, looking north at Reider Farm, September 18, 1902.

WESTCHESTER COUNTY, N. Y.: BRIARCLIFF-ECHO LAKE ROAD, No. 54.

Showing improvement by State Engineer during 1902. Base and top of crushed local granitic rock; base bound with screenings of same; top bound with screenings of same and of limestone.

Standard crushed quartz. The standard crushed quartz used in the tests shall pass a sieve of 400 meshes per square inch and shall stop on a sieve of 900 meshes per square inch.

The sand which is to be used on the works is also examined and tested, as provided in the following extract from the 1900 standard specifications of this Department:

SAND. Sand used for mortar shall be of the best quality available and shall be of the cleanest and sharpest found in the vicinity of the work.

Samples. The contractor shall inform the State Engineer, as soon as the contract is awarded, what sand is proposed to be used, and samples of this sand will be obtained by the Engineer and forwarded to Albany.

Tests. These samples will be examined and tested at the cement testing laboratory at Albany and if found to contain an injurious amount of loam or silt, or material that is friable or soluble, the contractor will be required to wash the sand before it is brought on the work.

Washing and clearing. It will be the duty of the engineer in charge to see that the soil overlying the sand bank is cleared away so that no soil shall slide or wash into the sand during its use, and special attention will be given during the progress of the work to see that dirty sand shall not be used in making mortar.

Notice has been given in the engineering publications that the municipal officials of New York State can also have the benefit of these facilities, and that all city and county engineers can have tests made of any cement for use in municipal work and that the results of such tests will be promptly furnished under the seal of the State Engineer, free of all charges of any kind. This system is calculated to benefit the public works of cities throughout the State.

A detailed report of the operations of the cement-testing laboratory are given in the appended report of the engineer in charge on p. 196.

COURT OF CLAIMS SURVEYS.

Surveys have been made of the various localities along the canals where claims have been filed for damages alleged to have been caused by the canal and by its works. In present.

ing these cases before the Court of Claims engineers of this Department have made and presented surveys, maps and photographs on behalf of the State, and the evidence thus produced has resulted in saving to the State much money.

Detailed description of the work thus done will be found in the appended reports of the Division Engineers.

It is recommended that the Legislature appropriate \$15,000 for the continuation of this work.

OYSTER BED SURVEYS.

The policy of the State which was initiated by the Hon. Eugene Blackford in 1887, and which has been continued by the successive Shellfish Commissioners, has had the effect to increase and extend the cultivation of oysters and to bring new lands into use and to increase the supply of oysters. This has required much work in the way of surveying and mapping lands under water for which the preparation of the necessary papers has been under the direction of this Department and of the Shellfish Commissioner, Hon. B. F. Wood.

Details of this work are given in the appended report of the Surveyor of Oyster Lands on p. 201.

LAND BUREAU.

This Department continues to have charge of the sale of State lands under water, and of the custody and care of ancient records.

The ancient records of this Department, as well as the modern ones, are of great value, and are frequently referred to. It has been the policy during my term of office to take every opportunity to add to the maps and records which are here on file, whenever this can be done without cost to the State, by enlisting the public spirit of citizens who possess such old records and who, like H. E. Pierrepont, Esq., of Brooklyn, wish to have these valuable papers preserved in the State Engineer's office, where they can be available for public use.



Briarcliff-Echo Lake Road No. 54, September 18, 1902.
 E. North from Walter W. Law's property.



Unionville-McKeel's Corners Road, No. 52, September 18, 1902.
 WESTCHESTER COUNTY, N. Y.: ROADS NO. 54 AND 52.
 Roads improved by State Engineer during 1902.
 Base and top of crushed local granitic rock. Base bound with local screenings; top bound with local and granitic screenings.



It is intended to thus make other valuable additions of this kind to the records of the State, as well as to provide for the better care and preservation of these records.

The report of the Clerk of the Land Bureau, giving in detail the operations during the past year, is appended at page 203.

BUREAU OF BRIDGE DESIGNING AND INSPECTION.

An important part of the duties of the State Engineer Department is the designing and inspection of the many bridges (about 800 in all) which the State is obliged to build and to maintain across the canals. The growth of the various cities during recent years has created an increased demand for lift-bridges, and those structures are of necessity much more expensive and intricate than the fixed bridges which they replace.

Previous to 1899, plans for bridges to be constructed by the State were prepared by the different engineering and bridge contracting firms. In 1899 the State Engineer decided that it was for the best interest of the State to have uniformity in these designs and also to have a thorough familiarity with them directly in this Department; this decision resulted in the enactment of chapter 476, Laws of 1899, providing for the appointment by the State Engineer of a bridge designer and inspector and of the necessary assistants. This bureau has been in existence since July 24, 1899, and its operations have been under the constant observation of the State Engineer with the most satisfactory results.

In addition to the designs for many ordinary bridges and for general repairs, there have, during the past year, been built two conspicuous bridges, of which pictures are herewith published, the one being an exceptionally large lift-bridge of entirely original design on West avenue, in Rochester, and the other being a fixed bridge on Pine street, in Lockport; both of which bridges give great satisfaction to the people who use them.

The operations of the bureau are detailed in the report of the Chief Bridge Designer appended at p. 206.

SURVEY OF THE STATE IN CO-OPERATION WITH THE UNITED STATES GEOLOGICAL SURVEY.

This work of co-operation was begun in 1892 and has since been continued by annual appropriations by the State, for the payment of one-half of the cost of the field work of the survey, the last being for \$20,000.

Close attention has been given and close examination made of the merits of this system of co-operation and of the character of the work which is done under it, and it is found that the State is getting a fine class of work at a comparatively low cost. The maps which are produced are of great value to the State in many ways; especially in connection with the work of highway improvement in different parts of the State and with the operations of the Forest Preserve Board in the portion covered by the maps, and in the examination of water-supplies for existing and proposed canals and for the great cities. A proof of each sheet is sent to this office from Washington for examination and approval before being finally published, and in this way judgment is made as to the character of the work and in some cases valuable additions are thus made.

The maps are published on a scale of about one inch to the mile, in sheets of which about 244 will cover the whole State; each sheet showing about twelve miles east to west by eighteen miles north to south. One hundred and twenty-four of these sheets have been completed and published and are for sale by the United States Geological Survey at the nominal price of five cents each, or \$2 per hundred; the engraving and publishing being done entirely at the expense of the United States Government. Thirty-eight sheets are mapped and in the hands of the engravers; ten are surveyed and are in the hands of the draftsmen. Of the remaining eighty-two which are required to cover the entire State, fifty-five have been triangulated and are ready to be surveyed for the final topographic mapping.

The operations are detailed in the supplement of this report at pp. 344 to 364 and the statement of Hon. Charles D.

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Sand-dune on ancient shore-line of Lake Ontario, from which material was taken to form filling across the marsh of the Irondequoit valley. Road in foreground along foot of dune.



Embankment of sand across marsh.

MONROE COUNTY, N. Y. : WEBSTER ROAD, No. 99, EASTWARD FROM ROCHESTER.

In progress of improvement by State Engineer, October 27, 1902.

Walcott, Director of the United States Geological Survey, is given at p. 342.

It is recommended to the Legislature that this co-operation of the State with the United States be continued, and that an appropriation of \$30,000 be made therefor.

SHINNECOCK AND PECONIC CANAL.

This canal was excavated by the State, 1884 to 1890, for the purpose of connecting the tidal waters of Great Peconic bay with the non-tidal waters of Shinnecock bay, by cutting through the narrow neck at Canoe Place. The result of the opening of this canal which was 4,000 feet long, 58 feet wide, and $4\frac{1}{2}$ feet deep at low-tide, was to lower the level of Shinnecock bay and to erode the sand forming the banks and bottom of the canal by the strong tidal currents passing through it. A swing-bridge was built to carry the highway across the canal and jetties were built to protect the entrance into Peconic bay.

To restore the high level of Shinnecock bay and to check these strong tidal currents in the canal, automatic tide-gates were built by the State in 1896. To construct these gates, a system of piles were driven, upon which was placed a platform of natural untreated plank supporting five pairs of tide-gates placed side by side; the total width of the opening thus spanned being 98 feet, and the navigable opening being 28 feet in the clear, with 5 feet depth at low water on mitre-sill. The details of this work are fully shown, with many photographs, in the report of the State Engineer for 1896 at pages 29 to 33.

In making repairs to these gates and their supporting platform and timbers during 1901, it was found that the timbers had been entirely destroyed by the toredo, which is active in these waters, and also that the plank platform had been freely undermined. It therefore became necessary to either abandon the works upon which \$195,500 had been expended since 1884, or to rebuild them in a thorough manner. To do this, it was necessary to place two coffer-dams across the canal and to build a concrete wall 10 feet deep below canal bottom with tongue and

groove sheet piles 20 feet deep to prevent undermining, and to build a concrete platform 3 feet thick and 22 feet wide, resting upon the tops of the piles which were embedded in the concrete; upon this to rebuild a framework and mitre-sills supporting the tide-gates with creosoted timber, and to replace the tide-gates in good working order. For this there was available \$30,000, which was appropriated by chapter 419 of Laws of 1900, of which \$16,569.76 was expended, the balance being now available for dredging and other improvement.

This work was completed February, 1902.

SURVEY.

Proposed canal between Hempstead Bay and Jamaica Bay on Long Island.—Chapter 262 of the Laws of 1902, directed that a survey be made for a navigable canal 6 feet depth and 50 feet width at mean low water level between the bays above named, being a distance of about 3 miles.

The results of the survey will be reported to the Legislature at this session.

BOUNDARY LINES OF THE STATE.

A triennial examination of the boundary lines of the State is required by chapter 678, Laws of 1892. The total length of the State boundary line is 1,416 miles, comprised as follows:

Canada line, 431 miles; Vermont line, 171 miles; Massachusetts line, 50½ miles; Connecticut line, to Long Island Sound, 81 miles; along the ocean around Long Island to the New Jersey shore, 246 miles; New Jersey line, 92½ miles; Pennsylvania line, 344 miles to the beginning of the Canada line in the middle of Lake Erie.

These boundaries are fixed by accepted agreements and are marked by natural watercourses or by monuments as here described.

NEW YORK AND CANADA.

The boundary line between the State of New York and the Dominion of Canada runs through Lake Erie about 50 miles to the head of the Niagara river; through the Niagara river about



Condition, April 1, 1902.



In progress, June 27, 1902.



Completed, July 23, 1902.

RENSSELAER COUNTY, N. Y.: TROY AND BRUNSWICK ROAD, NO. 25, NORTHEAST
FROM TROY, N. Y.

Showing improvement by State Engineer during 1902. Base and top of crushed
local quartzite, bound with screenings of same.



34 miles to Lake Ontario; through Lake Ontario about 175 miles to the head of the St. Lawrence river; thence northeasterly through the St. Lawrence river about 108 miles to a point 151 feet north of latitude 45 on the bank of the St. Lawrence river, which thus far is the boundary between the State of New York and the Province of Ontario; thence easterly 64 1-3 miles to a point on the Richelieu river, at the outlet of Lake Champlain, 4,200 feet north of latitude 45, which last section is the boundary between the State of New York and the Province of Quebec. The last described portion of the line from the St. Lawrence river to the outlet of Lake Champlain was intended to follow the forty-fifth parallel. It was so mentioned in 1606 in a patent by King James First, describing this as the northern limit of certain territory, a part of which afterwards became New York State. By a proclamation of October 7, 1763, latitude 45 was also fixed as the boundary between the Province of Quebec and New York, and this was confirmed in council, August 12, 1768. This line was surveyed by Valentine and Collins in 1773 and 1774, who endeavored to run the forty-fifth parallel, but failed to do it accurately.

By the treaty of Paris, 1783, the forty-fifth parallel was again recognized as the northern boundary of this part of the State of New York.

By the treaty of Ghent, December 24, 1814, the same line was recognized as the boundary and its resurvey was provided for, and this was done by an international commission in 1818-1819. It was then found that the line of 1773-1774 did not follow the forty-fifth parallel, but was 151 feet north of it at the St. Lawrence river. It crossed the parallel to the southward, 4 miles east of the St. Lawrence river, running 2,506 feet south at 17½ miles east of the St. Lawrence river, and again crossing the parallel to the northward at 35 miles east of the St. Lawrence river, was 4,200 feet north of it at the outlet of Lake Champlain.

This is well shown on map accompanying Report of the State Engineer and Surveyor of New York for 1890, page 412.

Meantime the United States had begun the construction of Fort Montgomery at a site on the west side of the Richelieu river, 2,000 to 3,000 feet north of the forty-fifth parallel. This was made the most elaborate fortification on the northern frontier, being founded on piles and formed of two tiers of casements and a barbette tier, and was originally intended to mount 300 guns. This fortification would be thrown into Canadian territory if the forty-fifth parallel was adopted, as provided by the 1814 treaty of Ghent. By the treaty of Washington of 1842 the old line of Collins and Valentine, as run in 1773-1774, was adopted instead of the forty-fifth parallel, and this was retraced, established and monumented by an international commission in 1846 and 1847. It was marked by two stones, near the Richelieu river, one stone on the banks of the St. Lawrence river and 127 cast-iron monuments set irregularly on the intervening 64 1-3 miles. The cast-iron monuments were fragile and were insecurely set, and it was found in 1900 that 69 of them needed replacing and resetting, as shown by photographs here published.

The entire line has been re-run during 1902 and remarked with new granite monuments set in bases of concrete, as shown by photographs here published and as proposed in detail at pp. 195 to 224 of the Report of this Department for 1900, by co-operation with the Dominion Government, which has shared the expense. The joint report appears at p. 67.

The operations are described at pp. 88-102.

NEW YORK AND VERMONT.

The boundary line between the States of New York and Vermont was originally established by commissioners of both States, whose report was submitted to the Legislature of each State in January, 1814. It was then marked by 33 marble monuments, the general condition of which is now bad, as stated in the letter to the Governor of Vermont at page 225 of the Report for 1900, and as found during an examination of the entire line made by a representative of this Department during September, 1902.



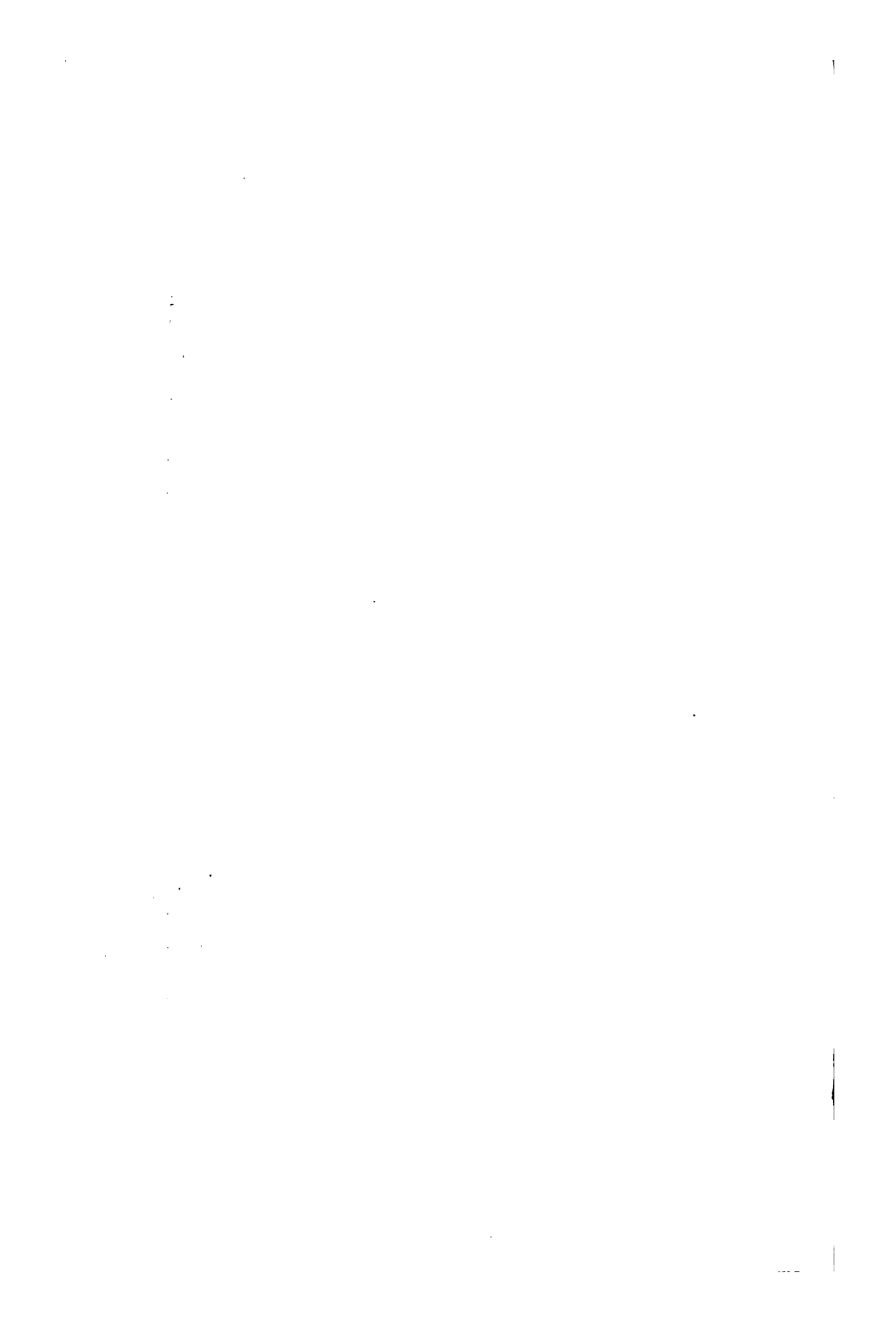
Condition June 1, 1902.
Looking southward from north end.



Condition June 1, 1902.
Looking northward from south end.

BROOME COUNTY, N. Y.: CHENANGO RIVER ROAD, No. 47, NORTH FROM
BINGHAMTON.

Along west side of Chenango river, $1\frac{1}{2}$ miles, as improved by State Engineer in 1901.
Base of crushed local field-stone bound with screenings of same. Top of crushed hard
limestone, bound with limestone screenings. 16 feet width of macadam.



For details as to the condition, see Report of State Engineer and Surveyor of New York for the year 1899, pp. 135 to 144, the only change since which date being that monument No. 2 has been destroyed by a freshet of the Hoosic river. A detailed report of the 1902 inspection is on file in this office.

NEW YORK AND MASSACHUSETTS.

The New York and Massachusetts line was originally determined by commissioners appointed by Congress in 1787, and was marked by stone heaps, stakes and crosses cut in rocks. It was re-established in 1897, 1898 and 1899 by officers of the State of New York and of the Commonwealth of Massachusetts, and during these years was marked by 121 monuments, of which number 83 are granite and 38 iron.

A full description of the re-establishing of this line and of the condition of its monuments is given in the Report of the State Engineer and Surveyor of New York for 1899, pp. 195 to 277. All of the monuments have been examined during 1902, by an engineer of this department and were found in good condition except No. 82, which leaned and was straightened. The clearing, which was made through the woods along the line, is rapidly growing up and will soon be of no aid in locating the monuments. The detailed report of the examination is on file in this office.

NEW YORK AND CONNECTICUT.

The New York and Connecticut line was disputed for nearly 200 years until 1860, when it was established by a commission representing the State of New York. It was then marked by 100 monuments of marble and of iron, the condition of which was found to be good by an examination made during October, 1900, by a representative of this Department.

See Reports of State Engineer and Surveyor of New York for 1896, pp. 420-443, and for 1900, pp. 227-252.

NEW YORK AND NEW JERSEY.

The portion of the boundary line lying generally through New York bay and the Hudson river, 25 miles, is marked by ranges along the shores of the river on various landmarks and crosses cut in the rock; all of which were established by commissioners of both States in 1891 and which have not since been examined. Full details are given in the reports of the New Jersey boundary commission of 1888 and 1891.

The portion lying across lands under water in Kill von Kull and Arthur Kill, about 18 miles, was established by commissioners of both States in 1888 and was then marked by 56 range monuments, most of which are in good condition. See Report of State Engineer and Surveyor of New York for 1900, pp. 253-254.

The portion of the line crossing land under water in Raritan bay, about 16 miles, was established by commissioners of both States in 1887 and was then marked by 8 buoys and 3 range monuments. The buoys are lost, but the monuments are in good condition. See Report of State Engineer and Surveyor of New York for 1900, pp. 254-263.

The portion of the line from the Hudson river to the Delaware river, 48½ miles, was established by commissioners of both States in 1774 and was then marked by 48 sandstone monuments; it was re-run by commissioners of both States in 1884 and 1885, and was then marked by 120 granite monuments. These consist of one "Eastern terminal monument" and two "Witness monuments," the "Tri-State monument" and 116 line monuments,—all of which are fully described in Report of State Engineer and Surveyor of New York for the year 1899, pp. 145 to 193. The entire line was examined during 1902 by an engineer of this Department, and all were found in good condition except Nos. 41, 42 and 43 which seem to have been destroyed or buried by some local improvements of the village of Suffern and also except No. 95, which needs to be reset. Steps have been taken to have these monuments restored. The detailed report of this examination is on file in this office.



After one year's use without repairs.



Showing bend between historic oak and old schoolhouse.

ORANGE COUNTY, N. Y. : COCHECTON ROAD, NEWBURG TO MONTGOMERY, No. 43.

Shale road after one year's use without repairs.

Improved by State Engineer during 1901. August 20, 1902.

NEW YORK AND PENNSYLVANIA.

The New York and Pennsylvania line was originally established by commissioners of both States in 1774, 1776 and 1787, and was then marked from the Delaware river at forty-second parallel of north latitude to the shore of Lake Erie by about 250 monuments. The old line was re-run under the direction of commissioners of both States in 1876 to 1885, and was marked by 570 new granite monuments, the general condition of which is found to be good by an examination made during 1900 by a representative of this Department.

See Report of State Engineer and Surveyor of New York for 1900, pp. 264-279.

ST. LAWRENCE COUNTY LINE.

The lack of a definite location of the southern and a part of the southwestern boundary of St. Lawrence county has been and now is the cause of many disputes, and it is much desired by the residents of this region that this line, which is a difficult one, should be located, established and monumented in a permanent manner.

This will require that preliminary surveys be made of the two present locations of the line, with investigations of the various authorities for each of these lines, and with a final survey of the correct one, and this work has been in progress during 1902 under appropriation made by chapter 473 of Laws of 1902 setting apart \$40,000, of which the expenditure is spread over three years. See p. 211 of this volume.

LEVELS.

Inquiries are frequently made by civil engineers throughout the State for accurate bench-marks which may be used as starting points for local surveys. Lines of more or less accurate levels have been run during past years in connection with the various surveys made by the U. S. Coast Survey, the U. S. Corps of Engineers Lake Survey, the U. S. Geological Survey,

the U. S. Deep Waterway Commission and the State Engineer's Department, and the various results have been published in different ways.

During 1901 connecting lines of levels were run by engineers of this Department having had special experience in work of this character and using approved instruments, rods and methods for accurate results.

These, taken in connection with the U. S. Deep Waterway levels of 1898-9, and with the levels of the Barge Canal Survey of 1901, give accurate bench-marks on all lock-sills, lock-copings and spillway crests from Greenbush, on the Hudson river, to Lake Erie at Buffalo, to Lake Ontario at Oswego and to Lake Champlain at Whitehall. The results were given in the report for 1901 and have been reprinted in a limited pocket-edition for free distribution to engineers who may ask for them.

MEASUREMENT OF THE VOLUME OF STREAMS AND FLOW OF WATER IN THE STATE OF NEW YORK.

There is an increasing desire to develop the many water powers throughout the State and a growing demand for increased water supplies for the great cities, with the result that the State Engineer receives many requests for the records of measurements of the volume of streams and of the flow of water. The approval which this new work of the State has received during the past two years has confirmed the wisdom of the Legislature of 1900 when it made the first appropriation for this work and enacted the following quoted law:

The People of the State of New York, represented in Senate and Assembly do enact as follows:

The treasurer shall pay on the warrant of the comptroller, for the state engineer and surveyor, one thousand dollars to be used with the United States geological survey in hydrographic work connected with the measurements of the volume of streams and flow of water in the State of New York.

This act became a law April 13, 1900, and the results have received a public approval so general that the subsequent Legislatures have slightly increased the amount to \$1,500 per



ORANGE COUNTY, N. Y.: FLORIDA-WARWICK ROAD, No. 93.
New location to avoid long, steep hill.
In progress of improvement by State Engineer August 20, 1902.

year which sum has been equalled or exceeded each year by the U. S. Geological Survey and the whole has been applied to the measurements of those streams of which the records were most needed, extending the field of operations wherever this could be done within the limits of the very small amount available.

This law is similar in its provisions and in its effect to existing laws in other States, and it has enabled the State Engineer to arrange a system of co-operation with the U. S. Geological Survey by which the State has the full benefit of the experienced and skilled observers of that Department and of their accurate instruments and methods, and thus obtains, at a merely nominal cost, much desired information which increases in value by its continuance from year to year.

New stations have been added wherever possible and records have been obtained from voluntary observers connected with manufactories on the various rivers who appreciate the value of having their records studied and collated by skilled hydrographers by whose work they are thus enabled to profit. Where paid observers are necessary, they usually read the gauges twice a day and record the readings and also the depth and the extent of ice on streams in the vicinity and report them once a month to the central office; for which service they receive an average of \$3.47 a month each.

A record of these gauge readings makes it possible to determine the mean volume of water passing it day by day, by means of current-meter measurements which are occasionally made by a skilled observer, who visits each station for a few hours at a time when the stream is at various heights and thus determines the amount of water passing for different heights of the gauge-reading, the discharge of the stream being fairly constant for a given height on the gauge and increasing in more or less regular ratio as the water-level rises. There is thus constructed for each stream a table showing the amount of water passing for any given height and there is thus obtained a complete record of the flow of the stream. Gauges are so

located that the meter observations can be made from a bridge spanning the stream whenever satisfactory conditions and regular flow are found, but such gauge locations are avoided if the flow is much disturbed by bridge-piers which sometimes make accurate records impossible. In some cases (as on the Oswego River, eight miles from Lake Ontario, and on the Moose River) a fixed wire cable is stretched across the stream well above water level, and the observer makes meter readings in a car in which he travels upon this cable.

It is intended to establish these meter-gauges upon streams where it is practicable and to gradually discontinue observations at dams where the conditions are unsatisfactory.

With the records obtained during 1902 there have also been collected certain heretofore unpublished former records of the same streams, and the results are here given in tables showing the daily mean flow, and also hydrographs which gives the same information graphically and which show at a glance the periods of high water and of low water and the regular or erratic character of the flow of the various streams, which differ widely with the varied nature of their watersheds.

Uniform hydrographs will be found representing the flow of streams which, like the Oswego River, have their headwaters in systems of lakes which affect the natural regulation of their flow and which prevent extremes of either high-water or low-water. Irregular hydrographs show the flow of streams having, like the Mohawk River, sudden and extreme variations due to a quick run-off from the cultivated hillsides which form their watersheds.

The tables give the daily means of flow in more detailed form, and such photographs are given as are necessary to show the varied conditions existing at the various stations.

There are in New York State a great many undeveloped water powers which are likely to be brought into use by the present possibilities of electrical development and long-distance transmission. Such a case is described in detail at page 153 of the supplement, as being an interesting illustration of what can be

done in this way on a comparatively small scale, and by which a stream which has formerly gone to waste has recently been made to produce about 1,000 horse power of electrical energy which the enterprising owner distributes to a number of towns in the vicinity.

The gratifying results which have been obtained by the co-operative system of stream measurements, are largely due to the effective attention and efforts of Mr. F. H. Newell, Chief Hydrographer of the U. S. Geological Survey at Washington, and of Prof. Henry A. Pressey, who has general charge of this portion of their operations, and also to Mr. Robert E. Horton, who is in local charge in this State, and whose detailed report with the photographs and tables which show the results, is appended at p. 11 to p. 340 of the supplement.

The value of these records is such as to show that the system should be still further extended and should be made to include many other important streams in different parts of the State regarding which inquiries have repeatedly been made, and the appropriation of \$3,000 is recommended for this purpose, although a larger sum could be used to great advantage.

CONCLUSION.

In closing this my fourth annual report, it is desired to express my appreciation of the many courtesies shown me by the Governor and by the various officials of the State, and also to acknowledge the ability and efficiency manifested by the employees of this department.

Respectfully submitted,

EDWARD A. BOND,

State Engineer and Surveyor of New York.

APPENDIX.

ENGINEERING EXPENSES FOR FISCAL YEAR
ENDING SEPTEMBER 30, 1902.

ENGINEERING EXPENSES FOR FISCAL YEAR ENDING SEPTEMBER 30, 1902.

Ordinary Repairs of Canals.

| WORK. | Act. | | Division. | Amount. | Total. | |
|------------------------------|-------|-------|--------------|-------------|-------------|-----------|
| | Chap. | Year. | | | | |
| Erie Canal..... | 418 | 1900 | Eastern..... | \$8,708 21 | \$13,060 11 | |
| | 644 | 1901 | | | | |
| Champlain canal..... | 418 | 1900 | Eastern..... | 4,351 90 | | |
| | 644 | 1901 | | | | |
| Erie canal..... | 418 | 1900 | Middle..... | \$8,421 51 | | |
| | 644 | 1901 | | | | |
| Oswego canal..... | 418 | 1900 | Middle..... | 657 52 | | |
| | 644 | 1901 | | | | |
| Cayuga and Seneca canals ... | 418 | 1900 | Middle..... | 433 60 | | |
| | 644 | 1901 | | | | |
| Black River canal..... | 418 | 1900 | Middle..... | 461 12 | 9,973 75 | |
| | 644 | 1901 | | | | |
| Erie canal..... | 418 | 1900 | Western..... | \$11,525 81 | | 11,525 81 |
| | 644 | 1901 | | | | |
| Total..... | | | | | \$34,559 67 | |

Extraordinary Repairs of Canals.

| WORK. | ACT. | | Division. | Amount. | Total. |
|-------------------------------|-------|-------|--------------|----------|------------|
| | Chap. | Year. | | | |
| Repairing Oriskany dam. . . . | 347 | 1901 | Middle..... | \$497 83 | \$1,309 09 |
| Repairing Cowasselon aque- | 347 | 1901 | Middle..... | 20 38 | |
| duct..... | | | | | |
| Rebuilding culvert, Fayette- | 347 | 1901 | Middle..... | 359 80 | |
| ville feeder..... | 347 | 1901 | Middle..... | 15 41 | |
| Fence around Geddes basin. . | 347 | 1901 | Middle..... | 47 00 | |
| Rebuilding Bridge st. bridge, | 347 | 1901 | Middle..... | 79 84 | |
| Geddes..... | 347 | 1901 | Middle..... | 45 00 | |
| Repairing Richmond aque- | 347 | 1901 | Middle..... | 14 31 | |
| duct..... | | | | | |
| Rebuilding Broadway bridge, | 347 | 1901 | Middle..... | 229 52 | |
| Fulton..... | 347 | 1901 | Middle..... | \$284 62 | |
| Rebuilding a b u t m e n t s | 347 | 1901 | Middle..... | 406 55 | |
| Westernville bridge..... | 347 | 1901 | Middle..... | 12 27 | |
| Repairs to Adirondack reser- | 347 | 1901 | Middle..... | 97 95 | 1,500 00 |
| voirs and roads, inserting | | | | | |
| pipes at South lake..... | | | | | |
| | 347 | 1901 | Middle..... | 46 75 | |
| Abutments, Drakes bridge. . . | 347 | 1901 | Western..... | 146 38 | |
| Strengthening banks..... | 347 | 1901 | Western..... | 9 04 | |
| Repair of aqueducts..... | 347 | 1901 | Western..... | 89 47 | |
| Ditching creek north of cul- | 347 | 1901 | Western..... | 99 10 | |
| vert 69..... | 347 | 1901 | Western..... | 105 08 | |
| Repair abutments bridges 166 | 347 | 1901 | Western..... | 13 79 | |
| and 167..... | 347 | 1901 | Western..... | 9 00 | |
| Repair vertical wall north | 347 | 1901 | Western..... | 64 75 | |
| abutment Tonawanda dam | 347 | 1901 | Western..... | 115 25 | |
| Pile and timber docking, Ton- | 347 | 1901 | Western..... | | |
| awanda creek..... | | | | | |
| Repair of culverts..... | 347 | 1901 | Western..... | | 2,809 09 |
| Repair of locks..... | 347 | 1901 | Western..... | | |
| Repair of bridge abutments.. | 347 | 1901 | Western..... | | Total..... |
| Repair of locks..... | 347 | 1901 | Western..... | | |
| Repair of bridge abutments.. | 347 | 1901 | Western..... | | |
| Repair of culverts..... | 347 | 1901 | Western..... | | |
| Repair of vertical walls..... | 347 | 1901 | Western..... | | |
| Total..... | | | | | |

Special Works.

| WORK. | Act. | | Division. | Amount. | Total. |
|---|-------|-------|--------------|----------|------------|
| | Chap. | Year. | | | |
| <i>Champlain Canal.</i> | | | | | |
| Removing obstructions, Bond and Wood creeks..... | 683 | 1901 | Eastern..... | \$300 00 | |
| Bridge, Burton's sawmill..... | 629 | 1898 | | | |
| | 219 | 1899 | | | |
| | 443 | 1900 | Eastern..... | 96 00 | |
| Green's bridge, Glens Falls feeder..... | 423 | 1901 | Eastern..... | 599 38 | |
| Bridge, Fulton street, Waterford..... | 697 | 1901 | Eastern..... | 864 69 | |
| Ontario st. bridge, Cohoes..... | 613 | 1899 | | | |
| | 682 | 1901 | Eastern..... | 1,155 75 | |
| <i>Erie Canal.</i> | | | | | |
| Bridge at Rexford flats..... | 693 | 1901 | Eastern..... | 870 00 | |
| Bridge over Otsuquaga creek.. | 468 | 1902 | Eastern..... | 26 39 | |
| Improvement Dry river, 14th street, Watervliet..... | 472 | 1902 | Eastern..... | 95 91 | |
| Dam at Beaver river..... | 606 | 1898 | | | |
| | 428 | 1900 | | | |
| | 679 | 1901 | Eastern..... | 3,373 94 | |
| Shinnecock canal improvement..... | 419 | 1900 | Eastern..... | 720 18 | |
| Repair sea wall at Orient..... | 692 | 1902 | Eastern..... | 434 20 | |
| Improving harbor, Canandaigua lake..... | 218 | 1900 | | | \$8,536 44 |
| | 594 | 1901 | | | |
| | 616 | 1902 | Middle..... | \$169 17 | |
| New road on Indian reservation..... | 645 | 1901 | Middle..... | 48 50 | |
| Brasher Falls dam, St. Regis river..... | 645 | 1901 | Middle..... | 50 54 | |
| Bridge, Schuyler st., Utica... | 427 | 1898 | | | |
| | 417 | 1900 | Middle..... | 13 98 | |
| Bridge, Washington st., Utica | 397 | 1898 | | | |
| | 402 | 1900 | | | |
| | 537 | 1900 | Middle..... | 245 80 | |
| Bridge, Catherine st., Syracuse..... | 424 | 1898 | | | |
| | 547 | 1900 | Middle..... | 123 64 | |
| Bridge, Brainard street, Whitesboro..... | 428 | 1901 | Middle..... | 59 00 | |
| Repairing sea walls, Owasco lake..... | 419 | 1900 | Middle..... | 297 26 | |
| <i>Oswego Canal.</i> | | | | | |
| Filling in north side cut at Spring st., Syracuse..... | 645 | 1901 | Middle..... | 57 85 | |
| Steel bulkheads at Braddock dam, Oswego river..... | 594 | 1902 | Middle..... | 73 04 | |
| Raising Minetto dam, Oswego river..... | 594 | 1902 | Middle..... | 7 00 | |
| <i>Cayuga and Seneca Canal.</i> | | | | | |
| Dredging inlet and repair pier, Cayuga lake..... | 645 | 1901 | Middle..... | 28 77 | |
| Dredging inlet and repair pier, Cayuga lake..... | 413 | 1902 | Middle..... | 103 59 | |
| Repairing and rebuilding walls of Liberty st. bridge, Penn Yan..... | 455 | 1900 | | | |
| | 681 | 1901 | Middle..... | 375 17 | |
| Guard lock and regulating Seneca lake..... | 680 | 1900 | | | |
| | 616 | 1902 | Middle..... | 3,088 16 | |
| Extending towpath at Geneva..... | 662 | 1900 | Middle..... | 843 87 | |
| Constructing sewers through towpath at Geneva..... | 594 | 1902 | Middle..... | 50 01 | |
| Bridge at Seneca Falls, C. and S. canal..... | 396 | 1900 | | | |
| | 616 | 1902 | Middle..... | 277 76 | |

Special Works — (Concluded).

| WORK. | Act. | | Division. | Amount. | Total. |
|--|-------|-------|--------------|----------|-------------|
| | Chap. | Year. | | | |
| <i>Black River Canal.</i> | | | | | |
| Castorland dyke, Black river. | 474 | 1902 | Middle..... | \$92 19 | |
| Forestport dam, Black river. | 420 | 1902 | Middle..... | 733 98 | |
| Bridge at Pratt's landing,
Black river..... | 670 | 1900 | | | |
| | 645 | 1901 | Middle..... | 644 09 | |
| <i>Erie Canal.</i> | | | | | \$7,393 37 |
| Lyell ave. foot bridge, Roch-
ester..... | 645 | 1901 | Western..... | \$117 95 | |
| Plymouth ave. bridge, Roch-
ester..... | 732 | 1901 | Western..... | 163 64 | |
| Monroe ave. drydock sewer .. | 645 | 1901 | Western..... | 50 00 | |
| Chapel st. bridge, Lockport .. | 573 | 1899 | | | |
| | 16 | 1900 | Western..... | 56 63 | |
| Eighteen-Mile creek improve-
ment..... | 151 | 1900 | | | |
| | 645 | 1901 | Western..... | 186 80 | |
| | 686 | 1901 | Western..... | 312 04 | |
| Vertical wall, Eagle harbor... | | | | | |
| Pine and Lock st. bridge,
Lockport..... | 43 | 1900 | Western..... | 1,703 64 | |
| Fullamtown bridge..... | 594 | 1902 | Western..... | 50 00 | |
| West ave. bridge, Rochester. | 549 | 1899 | Western..... | 1,910 56 | |
| Ohio st. bridge, Buffalo..... | 695 | 1901 | Western..... | 53 10 | |
| Ferry st. bridge, Buffalo..... | 618 | 1899 | | | |
| | 696 | 1901 | Western..... | 80 99 | |
| Erie basin improvement..... | 595 | 1902 | Western..... | 1,255 66 | |
| Dyke, Chemung river..... | 475 | 1902 | Western..... | 465 85 | |
| Onoville bridge, Indian reser-
vation..... | 467 | 1902 | Western..... | 250 00 | |
| Cassadaga lakes, outlet..... | 594 | 1902 | Western..... | 149 54 | |
| Glen creek improvement..... | 699 | 1901 | Western..... | 488 20 | |
| Cattaraugus creek bridge.... | 685 | 1901 | Western..... | 208 20 | |
| | | | | | 7,502 80 |
| Totals..... | | | | | \$23,422 61 |

Special Surveys.

| WORK. | Act. | | Division. | Amount. | Total. |
|---|-------|-------|--------------|------------|-------------|
| | Chap. | Year. | | | |
| Barge canal survey..... | 411 | 1900 | Eastern..... | \$5,458 80 | |
| St. Lawrence Co. line survey .. | 473 | 1902 | Eastern..... | 8,915 11 | |
| Forest Preserve Board sur-
veys..... | 645 | 1901 | | | |
| | 594 | 1902 | Eastern..... | 2,050 74 | |
| Court of Claims surveys..... | 419 | 1900 | | | |
| | 645 | 1901 | Eastern..... | 2,573 46 | |
| Examination monuments and
maps..... | 419 | 1900 | | | |
| | 645 | 1901 | | | |
| | 594 | 1902 | Eastern..... | 9,699 88 | |
| Old field notes, maps, etc.... | 645 | 1901 | Eastern..... | 477 00 | |
| Topographic surveys..... | 645 | 1901 | | | |
| | 594 | 1902 | Eastern..... | 22,039 94 | |
| Hydrography..... | 594 | 1902 | Eastern..... | 402 54 | |
| | | | | | \$51,617 47 |
| Court of Claims surveys | 419 | 1900 | | | |
| | 645 | 1901 | Middle..... | \$2,274 36 | |
| | | | | | 2,274 36 |
| Court of Claims surveys | 419 | 1900 | | | |
| | 645 | 1901 | Western..... | \$1,753 11 | |
| | | | | | 1,753 11 |
| Total..... | | | | | \$55,644 94 |

Bureau of Bridge Design and Inspection.

Chapter 476, Laws 1899; chapter 645, Laws 1901; chapter 594, Laws 1902.

| NAME. | Rank. | Rate of compensation. | Salary. | Travel. | Total. |
|---|-------------------------|-----------------------|------------|----------|------------|
| Wm. R. Davis | Chief bridge designer.. | * | \$2,830 00 | \$315 53 | \$3,145 53 |
| John G. Peck | Bridge designer..... | \$2,000 00 per year | 1,967 96 | 12 84 | 1,980 82 |
| C. T. Middlebrook | First ass't engineer.. | 6 00 per day | 1,542 00 | 116 72 | 1,658 72 |
| G. A. Fairbanks..... | Ass't engineer | 5 00 per day | 1,335 00 | ..... | 1,335 00 |
| L. B. Jones | Leveler | 4 50 per day | 572 75 | ..... | 572 75 |
| F. L. Schlick | Bridge draftsman | 5 00 per day | 140 0 | ..... | 140 00 |
| <i>Incidental Expenses.</i> | | | | | \$8,534 12 |
| Drafting instruments, drawing and blue print paper, tracing cloth, etc..... | | | | | 227 58 |
| Total..... | | | | | \$9,062 00 |

*\$2,800.00 per year from Oct. 1, 1901 to Aug. 1, 1902. \$3,000.00 per year from Aug. 1, 1902 to Oct. 1, 1902.

Highway Improvement.

| | Act. | | Division. | Amount. | Total. |
|--|-------|-------|-----------|-------------|--------------|
| | Chap. | Year. | | | |
| Surveys and plans and construction | 115 | 1898 | Eastern. | \$64,688 50 | \$70,920 92 |
| | 58 | 1902 | Eastern. | 6,232 42 | |
| Surveys and plans and construction..... | 115 | 1898 | Middle. | 17,442 29 | \$17,450 18 |
| | 115 | 1898 | Middle. | 7 89 | |
| Surveys and plans and construction..... | 115 | 1898 | Western. | \$27,159 27 | 30,971 14 |
| | 58 | 1902 | Western. | 3,811 87 | |
| Total..... | | | | | \$119,342 24 |

Summary of Engineering Expenses for the Fiscal Year ending September 30, 1902.

| DIVISION. | Ordinary repairs of canals. | Extraordinary repairs of canals. | Bureau of bridge design. | Special works. | Special surveys. | Highway improvement. | Total. |
|------------------------------|-----------------------------|----------------------------------|--------------------------|----------------|------------------|----------------------|--------------|
| Eastern | \$13,060 11 | ..... | ..... | \$8,536 44 | \$51,617 47 | \$70,920 92 | \$144,134 94 |
| Middle | 9,973 75 | \$1,309 09 | ..... | 7,383 37 | 2,274 36 | 17,450 18 | 88,390 75 |
| Western | 11,525 81 | 1,500 00 | ..... | 7,502 80 | 1,753 11 | 30,971 14 | 53,252 86 |
| Bureau of bridge design..... | ..... | ..... | \$9,062 00 | ..... | ..... | ..... | 9,062 00 |
| Total..... | \$34,559 67 | \$2,809 09 | \$9,062 00 | \$23,422 61 | \$55,644 94 | \$119,342 24 | \$244,840 55 |

TABLE OF CONTRACTS PENDING SEPTEMBER 30TH, 1902.

| NAME OF CONTRACTOR | Date of contract. | Character of work. | Division. | Appropriation. | LEGISLATIVE ACT. | | Engineer's preliminary estimate. | Engineer's estimate at contract prices. | Payments estimate to date. |
|--|-------------------|---|-----------|--------------------------------------|-------------------|----------------------|----------------------------------|---|----------------------------|
| | | | | | Chap. | Year. | | | |
| Joseph Baker..... | July 23, 1901 | For excavating a channel approach to the lower end of the lock in the dam across the Saranac River recently built by Joseph H. Connors | Eastern | \$2,000 00 | 688 | 1901 | \$600 00 | \$600 00 | \$408 00 |
| American Bridge Co..... | Oct. 23, 1901 | For constructing a bridge across the Champlain Canal at Ontario street, Cohoes | Eastern | { 5,000 00
8,000 00 | 613
682 | 1899
1901 | { 13,466 00
10,405 50 | | 7,038 00 |
| American Bridge Co..... | Oct. 23, 1901 | For constructing a bridge and approaches thereto over the Erie Canal just west of the Upper Mohawk Aqueduct, near Rexford Flats, Saratoga and Schenectady Counties | Eastern | 10,000 00 | 693 | 1901 | 8,700 00 | 8,128 00 | 5,796 00 |
| Strobel & Moynahan..... | Dec. 24, 1901 | For constructing a dam on Beaver River near Stillwater, in the town of Webb, Herkimer County | Eastern | { 7,000 00
43,000 00
35,000 00 | 606
428
679 | 1898
1900
1901 | { 75,000 00
75,045 00 | | 26,514 00 |
| Joseph Hanigan | Aug. 1, 1902 | For building a sea wall between the Sound and Orient Harbor on that part of Long Island lying between the villages of East Marion and of Orient, in the town of Southold, Suffolk county, Long Island | Eastern | 15,600 00 | 692 | 1901 | 13,323 00 | 13,382 00 | 5,130 00 |
| Owego Bridge Co. | July 21, 1902 | For constructing a bridge over the Otsego Creek, in the village of Fort Plain, town of Minden, Montgomery county | Eastern | 6,500 00 | 468 | 1902 | 5,453 50 | 6,822 50 | ..... |
| Snell Brothers..... | Sept. 8, 1902 | For constructing retaining walls, sidewalks and curbing at the approaches to the bridge over the Erie canal, at fourteenth street, Watervliet, and for rebuilding the vertical slope walls and excavating the channel of Dry River in said city | Eastern | 15,000 00 | 472 | 1902 | 13,240 00 | 12,234 75 | ..... |
| John R. Y. Craigie and Stephen Maggio..... | Sept. 12, 1900 | Guard lock, etc., Seneca Lake outlet.... | Middle | 97,000 00 | 680
616 | 1900
1902 | { 76,440 00
86,573 00 | | 52,258 00 |
| William H. Welch..... | Oct. 4, 1900 | Excavating and deepening the harbor and channel, and the entrance at the foot of Canandaigua Lake..... | Middle | { 10,000 00
5,000 00 | 218
616 | 1900
1902 | { 7,875 00
7,831 25 | | 5,304 00 |

| | | | | | | | | | |
|--|----------------|---|---------|-----------|-------------------|----------------------|-----------|-----------|-----------|
| American Bridge Co. | Aug. 8, 1901 | Pratt's Landing Bridge, Black river. | Middle | 20,000 00 | 670
645
594 | 1900
1901
1902 | 14,500 00 | 16,790 00 | 12,546 00 |
| Battle Island Paper Co. | June 3, 1902 | Constructing a steel bulkhead at Battle Island dam, Oswego river. | Middle | 6,600 00 | 594 | 1902 | 6,600 00 | 6,199 50 | 4,320 00 |
| Walter Bradley & Co. | June 3, 1902 | Raising and completing high dam, Oswego river. | Middle | 8,692 32 | 645
594 | 1901
1902 | 4,677 00 | 4,277 75 | |
| Walter Bradley & Co. | June 3, 1902 | Raising and completing Minetto dam, Oswego river. | Middle | 9,400 00 | 645
594 | 1901
1902 | 5,060 00 | 4,530 00 | |
| J. T. Campbell. | Aug. 21, 1902 | Raising Carthage bridge, Black river. | Middle | 1,000 00 | 594 | 1902 | 1,256 89 | 999 00 | ..... |
| Walter Bradley & Co. | June 3, 1902 | Forestport dam, Black river. | Middle | 45,000 00 | 420 | 1902 | 39,632 50 | 37,096 75 | 8,154 00 |
| B. P. Clark. | Jan. 28, 1902 | Brusher Falls dam, St. Regis river. | Middle | 3,500 00 | 645 | 1901 | 3,066 00 | 3,229 50 | ..... |
| Owego Bridge Co. | Sept. 30, 1902 | South James street bridge, at Rome, N. Y. | Middle | 22,000 00 | 614 | 1902 | 14,685 50 | 17,445 00 | ..... |
| Owego Bridge Co. | Oct. 29, 1901 | Cataaugus Creek bridge. | Western | 17,000 00 | 685 | 1901 | 16,882 50 | 14,574 00 | 10,548 00 |
| Owego Bridge Co. | April 24, 1902 | Plymouth Avenue bridge, Rochester, N. Y. | Western | 50,000 00 | 732 | 1901 | 48,415 00 | 43,320 00 | ..... |
| Owego Bridge Co. | April 24, 1902 | Ferry street bridge, Buffalo, N. Y. | Western | 30,000 00 | 618
696 | 1899
1901 | 28,307 00 | 26,860 50 | |
| William H. Schmidt. | Sept. 18, 1902 | Onoville bridge. | Western | 29,000 00 | 467 | 1902 | 28,454 00 | 25,311 50 | ..... |
| <i>Improvement of Public Highways.</i> | | | | | | | | | |
| Fred G. Kerivan. | May 8, 1900 | Frankfort and Utica road No. 14, Herkimer county. | Eastern | ..... | 115 | 1898 | 7,942 00 | 6,899 00 | 4,035 92 |
| Thomas H. Karr. | July 16, 1901 | Troy and Brunswick (section 2), road No. 25, Rensselaer county. | Eastern | ..... | 115 | 1898 | 28,820 00 | 24,340 00 | 16,246 95 |
| The town board of the town of Shandaken. | June 10, 1901 | Ulster and Delaware turnpike (section 3) road No. 31, Ulster county. | Eastern | ..... | 115 | 1898 | 41,728 00 | 34,494 00 | 27,865 92 |
| Alfred D. Norton, assignee of John R. Briggs. | June 5, 1901 | Gloversville-Mayfield road No. 33, Fulton county. | Eastern | ..... | 115 | 1898 | 33,720 00 | 27,456 09 | 12,664 64 |
| The town board of the town of Middletown. | June 18, 1901 | Griffin's Corners road No. 36, Delaware county. | Eastern | ..... | 115 | 1898 | 6,160 00 | 5,550 20 | 7,944 64 |
| Bellaw & Merritt Co. | May 6, 1902 | Saugerties-Woodstock (section 2) road No. 38, Ulster county. | Eastern | ..... | 115 | 1898 | 35,520 00 | 32,300 00 | 8,963 25 |
| Board of Supervisors of Orange county. | June 18, 1901 | Turners-Monroe road No. 46, Orange county. | Eastern | ..... | 115 | 1898 | 3,220 00 | 2,884 40 | ..... |
| Eldert & Johanknecht. | July 22, 1901 | Armonk-Mt. Kisco road No. 50, Westchester county. | Eastern | ..... | 115 | 1898 | 37,562 00 | 34,200 00 | 20,194 50 |
| Bellaw & Merritt Co. | July 24, 1901 | Mt. Kisco-Bedford road No. 51, Westchester county. | Eastern | ..... | 115 | 1898 | 44,064 00 | 40,314 77 | 39,512 50 |
| McCabe & Duffy. | July 17, 1901 | Briar Cliff Manor and Echo Lake road No. 54, Westchester county. | Eastern | ..... | 115 | 1898 | 22,540 00 | 20,100 00 | 14,773 50 |

TABLE OF CONTRACTS PENDING SEPTEMBER 30, 1902—(Continued).

| NAME OF CONTRACTOR | Date of contract. | Character of work. | Division. | Appropriation. | LEGISLATIVE ACT. | | Engineer's preliminary estimate. | Engineer's estimate at contract prices. | Payments to date. |
|--|-------------------|--|-----------|----------------|------------------|-------|----------------------------------|---|-------------------|
| | | | | | Chap. | Year. | | | |
| Prescott & Buckley Construction Co..... | June 7, 1901 | Windsor road (section 1) No. 57, Clinton county..... | Eastern | ..... | 115 | 1898 | \$7,780 00 | \$6,800 00 | \$4,284 00 |
| E. & J. E. Martin..... | July 27, 1901 | Waterford-Mechanicville (section 2) road No. 39, Saratoga county..... | Eastern | ..... | 115 | 1898 | 36,532 00 | 32,900 00 | 12,877 50 |
| Board of Supervisors of Orange county..... | June 20, 1902 | Walden-Scott's Corners road No. 64, Orange county..... | Eastern | ..... | 115 | 1898 | 5,640 00 | 4,400 00 | 3,003 00 |
| Board of Supervisors of Orange county..... | June 20, 1902 | Montgomery-Goshen road No. 65, Orange county..... | Eastern | ..... | 115 | 1898 | 38,160 00 | 32,850 00 | 5,666 63 |
| Snell Brothers..... | May 17, 1902 | Quaker Street (section 1) road No. 73, Schenectady county..... | Eastern | ..... | 115 | 1898 | 15,993 00 | 14,500 00 | 4,676 25 |
| Harry L. Smith..... | May 16, 1902 | Albion-Wyman's Hill road No. 77, Rensselaer county..... | Eastern | ..... | 115 | 1898 | 12,180 00 | 10,920 00 | 5,241 60 |
| Bellew & Merritt Co..... | May 12, 1902 | Troy and Rensselaer (section 3) road No. 84, Rensselaer county..... | Eastern | ..... | 115 | 1898 | 19,340 00 | 18,913 00 | 5,532 05 |
| Bellew & Merritt Co..... | May 12, 1902 | Fort Edward-Sandy Hill road No. 85, Washington county..... | Eastern | ..... | 115 | 1898 | 8,480 00 | 7,632 00 | 7,538 75 |
| Bellew & Merritt Co..... | May 12, 1902 | Grassy Point-Sherwood's Bridge (section 1) road No. 90, Rockland county..... | Eastern | ..... | 115 | 1898 | 24,100 00 | 21,690 00 | 162 68 |
| Eldert & Johannecht..... | May 20, 1902 | Nyack turnpike (section 1) road No. 91, Rockland county..... | Eastern | ..... | 115 | 1898 | 29,980 00 | 27,100 00 | 4,268 25 |
| Bellew & Merritt Co..... | May 12, 1902 | Delmair-Slingerlands road No. 92, Albany county..... | Eastern | ..... | 115 | 1898 | 17,630 00 | 15,863 00 | 3,928 09 |
| Board of Supervisors of Orange county..... | June 20, 1902 | Florida-Warwick road No. 93, Orange county..... | Eastern | ..... | 115 | 1898 | 29,450 00 | 25,350 00 | 10,076 63 |
| Board of Supervisors of Orange county..... | June 20, 1902 | Middletown-Goshen road No. 95, Orange county..... | Eastern | ..... | 115 | 1898 | 29,710 00 | 25,575 00 | 5,754 38 |
| Bellew & Merritt Co..... | May 12, 1902 | Shunpike road, No. 97, town of White Creek, Washington county..... | Eastern | ..... | 115 | 1898 | 26,075 00 | 23,468 00 | 6,512 37 |
| James R. Williams..... | May 26, 1902 | Barracks road No. 102, Rensselaer county..... | Eastern | ..... | 115 | 1898 | 19,575 00 | 16,987 00 | ..... |
| William A. Burnham..... | May 7, 1902 | Granville-Middle Granville road No. 103, Washington county..... | Eastern | ..... | 115 | 1898 | 10,175 00 | 8,998 00 | 4,049 10 |
| Snell Brothers..... | May 17, 1902 | Quaker Street (section 2) road No. 105, Schenectady county..... | Eastern | ..... | 115 | 1898 | 2,460 00 | 2,250 00 | 168 75 |
| Snell Brothers..... | May 17, 1902 | Quaker Street (section 3) road No. 106, Schenectady county..... | Eastern | ..... | 115 | 1898 | 1,225 00 | 1,125 00 | ..... |

TABLE OF CONTRACTS.

51

| | | | | | | | | |
|--|---------------|---|---------|-----|------|-----------|-----------|-----------|
| Bellew & Merritt Co..... | May 12, 1902 | Fultonville-Glen road No. 107, Montgomery county..... | Eastern | 115 | 1898 | 36,940 00 | 32,740 00 | 5,647 65 |
| Bellew & Merritt Co..... | May 12, 1902 | Mohawk River turnpike (west) road No. 108, Montgomery county..... | Eastern | 115 | 1898 | 31,400 00 | 27,700 00 | 415 50 |
| Mott & Kemper..... | May 20, 1902 | Argersinger road No. 109, Fulton county..... | Eastern | 115 | 1898 | 17,780 00 | 15,500 00 | ..... |
| Mott & Kemper..... | May 20, 1902 | Main street road No. 110, Fulton county..... | Eastern | 115 | 1898 | 17,400 00 | 15,500 00 | ..... |
| Board of Supervisors of Orange county..... | June 20, 1902 | Cochecton turnpike (section 1) road No. 113, Orange county..... | Eastern | 115 | 1898 | 20,740 00 | 18,666 00 | 5,039 82 |
| Board of Supervisors of Orange county..... | June 20, 1902 | Middletown-Pine Bush (section 2) road No. 114, Orange county..... | Eastern | 115 | 1898 | 4,120 00 | 3,708 00 | 2,586 33 |
| Board of Supervisors of Orange county..... | June 20, 1902 | Central Valley-Turners road No. 115, Orange county..... | Eastern | 115 | 1898 | 19,750 00 | 17,775 00 | 9,465 19 |
| Town board of the town of Esopus..... | May 19, 1902 | Kingston-Rifton road No. 116 A, Ulster county..... | Eastern | 115 | 1898 | 43,650 00 | 38,687 00 | 13,927 32 |
| Town board of the town of Ulster..... | May 19, 1902 | Kingston-Rifton road No. 116 B, Ulster county..... | Eastern | 115 | 1898 | 9,050 00 | 7,413 00 | ..... |
| Town board of the town of Shandaken..... | May 15, 1902 | Ulster and Delaware turnpike (section 2) road No. 117, Ulster county..... | Eastern | 115 | 1898 | 54,200 00 | 45,700 00 | 6,169 50 |
| Eldert, Johanknecht & Co... | May 20, 1902 | Shandaken-Hurley road No. 118, Ulster county..... | Eastern | 115 | 1898 | 35,350 00 | 27,584 00 | 1,034 40 |
| Thomas H. Karr..... | July 25, 1902 | Loudon (section 2) road No. 119, Albany county..... | Eastern | 115 | 1898 | 38,800 00 | 33,740 00 | 506 10 |
| Joseph Walker..... | May 22, 1902 | Canajoharie-Sharon Springs road No. 120, Montgomery county..... | Eastern | 115 | 1898 | 38,950 00 | 31,945 00 | 4,791 75 |
| Bellew & Merritt Co..... | May 12, 1902 | North road No. 121 Albany county..... | Eastern | 115 | 1898 | 14,500 00 | 12,230 00 | 12,347 11 |
| Charley & Cuddeback..... | Nov 29, 1901 | Shanawakee-Westlake road No. 48, Onondaga county..... | Middle | 115 | 1898 | 9,100 00 | 8,298 00 | 5,165 51 |
| John Dunfee & Co..... | May 17, 1902 | Fabius and Apulia (section 1) road No. 49, Onondaga county..... | Middle | 115 | 1898 | 17,900 00 | 16,000 00 | 1,800 00 |
| Supervisors Oneida county..... | May 6, 1902 | Utica and Paris, road No. 71, Oneida county..... | Middle | 115 | 1898 | 47,200 00 | 42,436 70 | 6,365 50 |
| Supervisors of Onondaga county..... | June 18, 1902 | Marcellus and Marietta road No. 74, Onondaga county..... | Middle | 115 | 1898 | 9,200 00 | 8,500 00 | ..... |
| John Dunfee & Co..... | May 17, 1902 | Fabius and Apulia (section 2) road No. 75, Onondaga county..... | Middle | 115 | 1898 | 8,800 00 | 7,800 00 | 1,228 50 |
| John Dunfee & Co..... | May 17, 1902 | Lafayette road No. 76, Onondaga county..... | Middle | 115 | 1898 | 8,000 00 | 7,800 00 | 3,042 00 |
| Town of Cortlandville..... | May 23, 1902 | Blodgett's Mills, road No. 111, Cortland county..... | Middle | 115 | 1898 | 6,100 00 | 5,512 05 | 1,033 51 |
| Mott & Kemper..... | May 20, 1902 | Norwich and Plymouth road No. 112, Chenango county..... | Middle | 115 | 1898 | 39,900 00 | 35,840 00 | 13,171 20 |

TABLE OF CONTRACTS PENDING SEPTEMBER 30, 1902 —(Concluded).

| NAME OF CONTRACTOR. | Date of contract. | Character of work. | Division. | Appropriation. | LEGISLATIVE ACT. | | Engineer's preliminary estimate. | Engineer's estimate at contract prices. | Payments to date. |
|---------------------------------------|-------------------|--|-----------|----------------|------------------|-------|----------------------------------|---|-------------------|
| | | | | | Chap. | Year. | | | |
| John Dunfee & Co..... | May 17, 1902 | Fabius and Apulia (section 3) road No. 121, Onondaga county..... | Middle | ..... | 115 | 1898 | \$9,950 00 | \$9,300 00 | \$5,301 00 |
| Supervisors of Onondaga county..... | June 18, 1902 | Skaneateles-East Lake road No. 122, Onondaga county..... | Middle | ..... | 115 | 1898 | 9,200 00 | 8,300 00 | ..... |
| Town of Preble..... | May 29, 1902 | Preble and Homer road No. 123, Cortland county..... | Middle | ..... | 115 | 1898 | 8,700 00 | 7,071 57 | 2,545 76 |
| John Dunfee & Co..... | July 2, 1902 | Lestershire road No. 125, Broome county..... | Middle | ..... | 115 | 1898 | 28,500 00 | 26,000 00 | 9,262 50 |
| Board of Supervisors Erie county..... | May 9, 1902 | Main street (section 1) road No. 89, Erie county..... | Western | ..... | 115 | 1898 | 28,000 00 | 25,000 00 | 17,812 50 |
| Board of Supervisors Erie county..... | May 9, 1902 | Main street (section 2) road No. 87 Erie county..... | Western | ..... | 115 | 1898 | 17,000 00 | 15,100 00 | 792 75 |
| Casey & Murray..... | May 20, 1902 | Hanlin (section 1) road No. 80, Monroe county..... | Western | ..... | 115 | 1898 | 39,000 00 | 37,000 00 | 27,195 00 |
| Casey & Murray..... | May 20, 1902 | Hanlin (section 2) road No. 81, Monroe county..... | Western | ..... | 115 | 1898 | 33,500 00 | 31,500 00 | 8,268 75 |
| George Chambers..... | May 20, 1902 | Buffalo (section 2) road No. 83, Monroe county..... | Western | ..... | 115 | 1898 | 42,000 00 | 38,500 00 | 26,853 75 |
| Board of Supervisors Erie county..... | May 9, 1902 | Transit (section 2) road No. 89, Erie county..... | Western | ..... | 115 | 1898 | 39,500 00 | 35,400 00 | 17,778 50 |
| Board of Supervisors Erie county..... | May 9, 1902 | Transit (section 2) road No. 89, Erie county..... | Western | ..... | 115 | 1898 | 42,000 00 | 37,700 00 | 565 50 |
| H. N. Cowles..... | May 20, 1902 | Webster (section 1) road No. 98, Monroe county..... | Western | ..... | 115 | 1898 | 19,600 00 | 17,500 00 | 10,893 75 |
| Frederick Brotsch..... | June 3, 1902 | Webster (section 2) road No. 99, Monroe county..... | Western | ..... | 115 | 1898 | 30,800 00 | 29,500 00 | 18,142 50 |
| Harry L. Smith..... | July 1, 1902 | Webster (section 3) road No. 100, Monroe county..... | Western | ..... | 115 | 1898 | 32,400 00 | 25,000 00 | 3,937 50 |
| Harry L. Smith..... | July 1, 1902 | Webster (section 4) road No. 101, Monroe county..... | Western | ..... | 115 | 1898 | 29,000 00 | 20,000 00 | ..... |
| Whitmore, Rauber and Vicinus..... | June 9, 1902 | Monroe avenue road No. 94, Monroe county..... | Western | ..... | 115 | 1898 | 35,400 00 | 32,300 00 | 19,137 75 |

TABLE OF CONTRACTS.

| | | | | | | | | | |
|---------------------------------------|---------------|---|---------|-------|-----|------|-----------|-----------|-----------|
| Board of Supervisors Erie county..... | June 11, 1902 | Big Tree road No. 86, Erie county..... | Western | ..... | 115 | 1898 | 42,500 00 | 38,637 00 | 7,803 22 |
| Board of Supervisors Erie county..... | June 11, 1902 | Orchard Park (section 2) road No. 66, Erie county..... | Western | ..... | 115 | 1898 | 11,600 00 | 10,100 00 | 6,135 75 |
| Board of Supervisors Erie county..... | June 11, 1902 | Orchard Park (section 3) road No. 67, Erie county..... | Western | ..... | 115 | 1898 | 37,500 00 | 32,600 00 | 978 00 |
| Board of Supervisors Erie county..... | June 11, 1902 | Orchard Park (section 4) road No. 68, Erie county..... | Western | ..... | 115 | 1898 | 13,000 00 | 11,300 00 | ..... |
| Anderson, Thomas & Brown | June 28, 1902 | West Henrietta road No. 62, Monroe county..... | Western | ..... | 115 | 1898 | 55,000 00 | 52,200 00 | 14,485 50 |
| John Dunfee & Co..... | July 2, 1902 | Scottsville (section 1) road No. 63, Monroe county..... | Western | ..... | 115 | 1898 | 19,700 00 | 17,990 00 | 6,341 48 |
| Anderson, Thomas & Brown | July 2, 1902 | Scottsville (section 2) road No. 79, Monroe county..... | Western | ..... | 115 | 1898 | 67,435 00 | 55,555 00 | ..... |
| John Dunfee & Co..... | July 2, 1902 | Clifton (section 1) road No. 78, Monroe county..... | Western | ..... | 115 | 1898 | 31,000 00 | 29,757 00 | ..... |

TABLE OF CONTRACTS COMPLETED DURING THE YEAR ENDING SEPTEMBER 30, 1902.

| NAME OF CONTRACTOR. | Date of contract. | Character of work | Division. | Appropriation. | LEGISLATIVE ACT. | | Engineer's estimate of contract prices. | Final estimate. |
|---|---|--|--|--|---------------------------------|--------------------------------------|--|--|
| | | | | | Chap. | Year. | | |
| Owego Bridge Co..... | Nov. 15, 1900 | For constructing a swing bridge over the Champlain canal, near Burton's saw mill in the town of Waterford, Saratoga county.... | Eastern | \$5,000 00
2,000 00
5,000 00
30,000 00 | 629
219
443
419 | 1898
1899
1900
1900 | \$10,150 00
\$9,220 10
11,710 00
16,569 76 | |
| Brunnellkamp & Lane.....
John Dunfee & Co..... | Nov. 1, 1900
Sept. 27, 1901 | For improving Shinnecock and Peconic canal.
For constructing a bridge over the Champlain canal at Fulton st., Waterford, Saratoga county..... | Eastern
Eastern | 10,000 00 | 697 | 1901 | 8,585 00 | 8,378 11 |
| Reardon & Burnham..... | Sept. 24, 1901 | For constructing a bridge (Green's bridge) over the Glens Falls feeder in the town of Queensbury, Warren county..... | Eastern | 6,000 00 | 423 | 1901 | 4,764 50 | 4,943 52 |
| American Bridge Co..... | Aug. 28, 1900 | Bridge over Seneca river near Rumsey street, Seneca Falls, N. Y..... | Middle | 8,000 00 | 224
396 | 1899
1900 | 12,765 00 | 6,148 83 |
| A. F. Chapman & Co..... | Oct. 6, 1900 | Constructing and extending the towpath at Geneva, N. Y..... | Middle | 45,000 00 | 662 | 1900 | 38,125 00 | 31,335 16 |
| Marson & Ryan..... | Oct. 9, 1901 | Repairing and rebuilding retaining walls, etc., Liberty street bridge, Penn Yan, N. Y..... | Middle | 2,400 00 | 681
427
417 | 1901
1898
1900 | 2,326 00
10,000 00 | 2,114 13
10,517 79 |
| Havana Bridge Works..... | Apr. 21, 1899 | Lift bridge at Schuyler street, Utica, N. Y..... | Middle | 18,000 00 | 397
402
537 | 1898
1900
1900 | 22,864 00 | 23,107 42 |
| Havana Bridge Works..... | Oct. 19, 1900 | Lift bridge at Washington street, Utica, N. Y. | Middle | 27,000 00 | 424
547
625 | 1898
1900
1899 | 13,530 70 | 20,654 42 |
| Havana Bridge Works..... | Oct. 11, 1900 | Lift bridge at Catharine and Almond streets, Syracuse, N. Y..... | Middle | 23,000 00 | 625
428
573 | 1899
1900
1899 | 1,456 25 | 1,538 66 |
| American Bridge Co..... | Oct. 23, 1901 | Bridge at Brainard street, Whitesboro, N. Y. | Middle | 2,000 00 | 16 | 1900 | 14,909 60 | 19,621 67 |
| Havana Bridge Works..... | Apr. 24, 1900 | Chapel street bridge, Lockport, N. Y..... | Western | 24,000 00 | 430
649
645
441
686 | 1900
1899
1900
1900
1901 | 64,743 00
67,294 00
2,704 00
3,879 60
3,938 75 | 51,758 23
67,838 57
2,418 09
2,703 00
3,099 67 |
| Niagara Construction Co.....
Havana Bridge Works.....
American Bridge Co.....
Henry Bearsley.....
Crahan & Kearns.....
King Bridge Co..... | Nov. 27, 1900
Oct. 16, 1900
Oct. 20, 1901
Oct. 16, 1900
Oct. 19, 1900
Mar. 1, 1901 | Pine and Lock street bridge, Lockport, N. Y.
West Avenue bridge, Rochester, N. Y.
Loyal Avenue foot bridge, Rochester, N. Y.
Corning dyke, Steuben county Corning, N. Y.
Vertical wall at Eagle Harbor, N. Y.
Vernoy street Bridge No. 144, Middleport, N. Y. | Western
Western
Western
Western
Western
Western | 76,000 00
76,000 00
3,000 00
4,800 00
4,000 00
2,714 40 | 311 | 1900 | 3,127 50 | 2,714 40 |
| King Bridge Co..... | Mar. 1, 1901 | Bridge No. 163, 2½ miles west of Tonawanda, N. Y..... | Western | 1,764 28 | 311 | 1900 | 1,980 00 | 1,764 28 |
| Maron & Ryan..... | Oct. 9, 1900 | Glen Creek improvement..... | Western | 6,037 83 | 699 | 1901 | 5,736 60 | 4,575 24 |

TABLE OF CONTRACTS.

55

Improvement of Public Highways.

| | | | | | | | |
|---|----------------|--|---------|-----|------|-----------|-----------|
| Donovan Brothers, assignee of
C. H. Lutiens & Son..... | May 12, 1909 | Delaware Turnpike road No. 7, Albany Co.,
county..... | Eastern | 115 | 1898 | 11,396 44 | 14,041 24 |
| Harry L. Smith..... | July 26, 1901 | Hastings-Ardsley road No. 17, Westchester
county..... | Eastern | 115 | 1898 | 500 00 | 1,132 00 |
| Bellew & Merritt Co..... | July 26, 1901 | Ardsley-Elmsford road No. 18, Westchester
county..... | Eastern | 115 | 1898 | 18,500 00 | 19,079 70 |
| Daniel Murray..... | July 23, 1900 | Mamaroneck-White Plains road No. 19,
Westchester county..... | Eastern | 115 | 1898 | 23,160 00 | 23,951 51 |
| George H. Smith..... | Sept. 11, 1901 | White Plains-Armouk road No. 20, West-
chester county..... | Eastern | 115 | 1898 | 12,767 62 | 12,767 62 |
| Thomas H. Karr..... | June 25, 1900 | Loudon road No. 22, Albany county..... | Eastern | 115 | 1898 | 27,400 00 | 32,615 00 |
| Town board of the town of
North Greenbush..... | June 20, 1901 | Troy and Greenbush (section 2) road No. 26,
Rensselaer county..... | Eastern | 115 | 1898 | 19,430 20 | 20,242 95 |
| Snell Brothers..... | June 5, 1901 | Amsterdam and Minaville road No. 32,
Montgomery county..... | Eastern | 115 | 1898 | 15,800 16 | 15,860 16 |
| McCabe & Duffy..... | May 31, 1901 | Ardsley-Elmsford (section 2) road No. 34,
Westchester county..... | Eastern | 115 | 1898 | 18,940 00 | 18,940 00 |
| Eldert & Johanknecht..... | July 22, 1901 | White Plains-Armouk (section 2) road No.
35, Westchester county..... | Eastern | 115 | 1898 | 22,800 00 | 22,800 00 |
| Edgar Snyder & Co., Jacob D.
Wurts, receiver..... | June 10, 1901 | Saugerties-Woodstock (section 1) road No.
37, Ulster county..... | Eastern | 115 | 1898 | 19,910 00 | 20,660 31 |
| E. & J. E. Martin..... | July 27, 1901 | Waterford-Mechanicville (section 1) road No.
39, Saratoga county..... | Eastern | 115 | 1898 | 10,700 00 | 11,212 00 |
| Callanan Road Improvement
Co..... | June 5, 1901 | Delaware Turnpike (section 2) road No. 41,
Albany county..... | Eastern | 115 | 1898 | 20,260 00 | 20,435 00 |
| Board of Supervisors of
Orange County..... | June 18, 1901 | Newburg-Woodbury road No. 42, Orange
county..... | Eastern | 115 | 1898 | 20,247 20 | 20,247 20 |
| Board of Supervisors of
Orange County..... | June 18, 1901 | Cochecton Turnpike road No. 43, Orange
county..... | Eastern | 115 | 1898 | 20,789 80 | 20,789 80 |
| Board of Supervisors of
Orange County..... | June 18, 1901 | Goshen-Florida road No. 44, Orange county.. | Eastern | 115 | 1898 | 8,757 30 | 8,757 30 |
| Board of Supervisors of
Orange County..... | June 18, 1901 | Middletown-Pine Bush road No. 45, Orange
county..... | Eastern | 115 | 1898 | 12,467 80 | 12,467 80 |
| McCabe & Duffy..... | May 31, 1901 | Unionville-McKeel's Corners road No. 52,
Westchester county..... | Eastern | 115 | 1898 | 26,870 00 | 26,870 00 |
| McCabe & Duffy..... | May 31, 1901 | McKeel's Corners-Briar Cliff Manor road No.
53, Westchester county..... | Eastern | 115 | 1898 | 12,644 00 | 12,644 00 |
| Thomas H. Karr..... | July 16, 1901 | Hoag's Corners-Troy Turnpike road No. 55,
Rensselaer county..... | Eastern | 115 | 1898 | 9,450 00 | 9,795 00 |
| Prescott & Buckley Construc-
tion Co..... | June 7, 1901 | Plattsburg-Keesville (section 1) road No. 56,
Clinton county..... | Eastern | 115 | 1898 | 16,900 00 | 17,070 81 |

REPORT OF STATE ENGINEER.

TABLE OF CONTRACTS COMPLETED DURING THE YEAR ENDING SEPTEMBER 30, 1902—(Concluded).

| NAME OF CONTRACTOR. | Date of contract. | Character of work. | Division. | Appropriation. | LEGISLATIVE ACT. | | Engineer's estimate of contract prices. | Final estimate. |
|---------------------------------|-------------------|--|-----------|----------------|------------------|-------|---|-----------------|
| | | | | | Chap. | Year. | | |
| Reardon & Burnham..... | June 4, 1901 | Saratoga-Glens Falls road No. 58, Saratoga county..... | Eastern | ..... | 115 | 1898 | \$31,000 00 | \$31,330 00 |
| Snell Brothers..... | May 17, 1902 | Amsterdam-Minerville (section 2) road No. 96, Montgomery county..... | Eastern | ..... | 115 | 1898 | 6,400 00 | 6,400 00 |
| Bellew & Merritt Co..... | May 12, 1902 | Granville-Troy Stage road No. 104, Washington county..... | Eastern | ..... | 115 | 1898 | 9,765 00 | 9,837 96 |
| Chambers & Casey..... | Aug. 12, 1901 | Chemungo river road No. 47, Broome county..... | Middle | ..... | 115 | 1898 | 15,980 00 | 15,980 00 |
| Town of Truxton..... | July 16, 1901 | Cuyler road No. 40, Cortland county..... | Middle | ..... | 115 | 1898 | 3,420 00 | 3,420 00 |
| Chambers & Casey..... | July 15, 1901 | Fairport road No. 60, Monroe county..... | Western | ..... | 115 | 1898 | 32,400 00 | 32,400 00 |
| Whitmore, Rauber & Vicinus..... | July 15, 1901 | Pittsford road No. 61, Monroe county..... | Western | ..... | 115 | 1898 | 13,200 00 | 13,200 00 |
| Swan & Murray..... | July 17, 1901 | Southport road (section 2), No. 28, Chemung county..... | Western | ..... | 115 | 1898 | 33,108 00 | 33,208 00 |
| Costello & Neagle..... | July 17, 1901 | Southport road (section 3) No. 29, Chemung county..... | Western | ..... | 115 | 1898 | 10,634 00 | 11,022 50 |
| Costello & Neagle..... | July 17, 1901 | South Broadway road No. 30, Chemung county..... | Western | ..... | 115 | 1898 | 9,167 00 | 9,867 00 |
| Geo. Chambers..... | May 20, 1902 | Buffalo road (section 1) No. 82, Monroe county..... | Western | ..... | 115 | 1898 | 2,700 00 | 2,700 00 |

TERMINATION OF CANAL CONTRACTS.

The following tables show the present condition of the seventy-four contracts for canal improvement made under chapter 79, Laws of 1895, and chapter 794, Laws of 1896, being the so-called "Nine Million Dollar Improvement" Act:

TABLE I.

The following named contractors have applied for the termination of contracts under chapter 544, Laws of 1899:

| | | |
|--------------------------------------|-----------------|-------------------|
| Clinton Beckwith..... | Contract No. 23 | Eastern Division. |
| Clinton Beckwith..... | " 27 | " " |
| John V. Quackenbush..... | " 16 | " " |
| John V. Quackenbush..... | " 24 | " " |
| O'Brien & Hoolihan..... | " 19 | Middle " |
| Edward H. Gaynor..... | " 23 | " " |
| Willoughby B. Priddy..... | " 27 | " " |
| John Dunfee & Co..... | " 4 | " " |
| John Dunfee & Co..... | " 26 | " " |
| Kirk, Driscoll & Co..... | " 34 | " " |
| John Kelly & Co..... | " 7 | " " |
| John Kelly & Co..... | " 8 | " " |
| John Kelly & Co..... | " 9 | " " |
| Hughes Bros. & Bangs..... | " 10 | " " |
| Lauer & Hagaman..... | " 6 | Eastern " |
| Lauer & Hagaman..... | " 18 | " " |
| Whitmore, Rauber & Vicinus..... | " 14 | Western " |
| Whitmore, Rauber & Vicinus..... | " 15 | " " |
| Dodge & McGregor..... | " 6 | Middle " |
| Troy Public Works Co..... | " 19 | Eastern " |
| Buffalo Dredging Co..... | " 2 | Western " |
| Baker, Banker & Hingston..... | " 29 | Eastern " |
| Baker & Banker..... | " 7 | Western " |
| Warren Scharf Asphalt Paving Co..... | " 20 | Middle " |
| Warren Scharf Asphalt Paving Co..... | " 21 | " " |
| Henry C. Allen & Co..... | " 13 | Western " |
| Walter Bradley..... | " 46 | Middle " |
| Mahan & Sundstrom..... | " 10 | Eastern " |
| Grannis & O'Connor..... | " 5 | Western " |

TABLE II.

The following named contractors have applied for the termination of contracts under chapter 81, Laws of 1900:

| | | |
|--------------------------------------|-----------------|------------------|
| Warren Scharf Asphalt Paving Co..... | Contract No. 20 | Middle Division. |
| Warren Scharf Asphalt Paving Co..... | " 21 | " " |
| Henry C. Allen & Co..... | " 13 | Western " |
| John W. Whalen..... | " 2 | Eastern " |
| Gallo & McNiece..... | " 4 | " " |
| Brummelkamp, Lane & Co..... | " 5 | " " |
| T. J. Dwyer & Co..... | " 1 | Middle " |
| McDonald & Sayre..... | " 2 | " " |
| John Dunfee & Co..... | " 3 | " " |
| John Dunfee & Co..... | " 5 | " " |
| O'Brien & Hoolihan..... | " 18 | " " |
| National Contracting Co..... | " 22 | " " |
| National Contracting Co..... | " 24 | " " |
| National Contracting Co..... | " 25 | " " |
| Pulford & Compton..... | " 28 | Eastern " |
| Grannis & O'Connor..... | " 5 | Western " |

TABLE III.

The following named contractors have applied for the termination of contracts under chapter 251, Laws of 1902:

| | | |
|--------------------------------|-----------------|------------------|
| Andrew Onderdonk..... | Contract No. 28 | Middle Division. |
| Furnaceville Iron Company..... | " 6 | Western " |
| Furnaceville Iron Company..... | " 9 | " " |
| Furnaceville Iron Company..... | " 10 | " " |
| Furnaceville Iron Company..... | " 11 | " " |
| Furnaceville Iron Company..... | " 12 | " " |

TABLE IV.

The following named contractor has made no application for termination of contract under either chapter 544, Laws of 1899, or chapter 81, Laws of 1900, or chapter 251, Laws of 1902:

| | | |
|-----------------------------------|----------------|-------------------|
| Williams, McNaughton & Bapst..... | Contract No. 8 | Western Division. |
|-----------------------------------|----------------|-------------------|

TABLE V.

CONTRACTS COMPLETED AND PAID.

| | | |
|--------------------------------------|----------------|-------------------|
| John V. Quackenbush..... | Contract No. 7 | Eastern Division. |
| Chambers & Casey..... | " 11 | " " |
| Shear & Haight..... | " 12 | " " |
| John V. Quackenbush..... | " 13 | " " |
| Thomas H. Karr..... | " 15 | " " |
| Thomas H. Karr..... | " 17 | " " |
| John Twomey..... | " 52 | " " |
| T. J. Dwyer & Co..... | " 12 | Middle " |
| Hughes Bros. & Bangs..... | " 13 | " " |
| John Kelly & Co..... | " 14 | " " |
| Owego Bridge Co..... | " 17 | " " |
| Rochester Bridge and Iron Works..... | " 47 | " " |
| Donnelly Contracting Co..... | " 1 | Western " |
| Whitmore, Rauber & Vicinus..... | " 4 | " " |
| Randerson & Seward..... | " 11 | Middle " |
| Walter Bradley..... | " 15 | " " |
| Edwin Lodder..... | " 36 | " " |
| Edwin Lodder..... | " 16 | " " |
| Willard Johnson..... | " 37 | " " |
| Whalen & Higgins..... | " 8 | Eastern " |
| John W. Whalen..... | " 9 | " " |
| John W. Flynn..... | " 30 | " " |
| C. J. Reardon & Co..... | " 31 | " " |
| Monty & Higley..... | " 53 | " " |
| Lauer & Hagaman..... | " 3 | " " |
| Clinton Beckwith..... | " 23 | " " |
| Clinton Beckwith..... | " 27 | " " |
| John V. Quackenbush..... | " 16 | " " |
| John V. Quackenbush..... | " 24 | " " |
| O'Brien & Hoolihan..... | " 19 | Middle " |
| Edward H. Gaynor..... | " 23 | " " |
| Willoughby B. Priddy..... | " 27 | " " |
| John Dunfee & Co..... | " 4 | " " |
| John Dunfee & Co..... | " 26 | " " |
| Kirk, Driscoll & Co..... | " 34 | " " |
| John Kelly & Co..... | " 7 | " " |
| John Kelly & Co..... | " 8 | " " |
| John Kelly & Co..... | " 9 | " " |
| Hughes Bros. & Bangs..... | " 10 | " " |
| Lauer & Hagaman..... | " 6 | Eastern " |
| Lauer & Hagaman..... | " 18 | " " |
| Whitmore, Rauber & Vicinus..... | " 14 | Western " |
| Whitmore, Rauber & Vicinus..... | " 15 | " " |
| Dodge & McGregor..... | " 6 | Middle " |
| Troy Public Works Co..... | " 19 | Eastern " |
| Baker, Banker & Hingston..... | " 29 | " " |
| T. J. Dwyer & Co..... | " 1 | Middle " |
| John Dunfee & Co..... | " 3 | " " |
| John Dunfee & Co..... | " 5 | " " |
| Gallo & McNiece..... | " 4 | Eastern " |

TERMINATION OF CANAL CONTRACTS.

59

| | | |
|--------------------------------------|-----------------|------------------|
| O'Brien & Hoolihan..... | Contract No. 18 | Middle Division. |
| Brummelkamp, Lane & Co..... | " 5 | Eastern " |
| McDonald & Sayre..... | " 2 | Middle " |
| National Contracting Co..... | " 22 | " " |
| National Contracting Co..... | " 24 | " " |
| National Contracting Co..... | " 25 | " " |
| John W. Whalen..... | " 2 | Eastern " |
| Grannis & O'Connor..... | " 5 | Western " |
| Mahan & Sundstrom..... | " 10 | Eastern " |
| Walter Bradley..... | " 46 | Middle " |
| Warren Scharf Asphalt Paving Co..... | " 20 | " " |
| Warren Scharf Asphalt Paving Co..... | " 21 | " " |
| Pulford & Compton..... | " 28 | Eastern " |
| Henry C. Allen & Co..... | " 13 | Western " |
| Total—64 contracts. | | |

CANCELLED CONTRACT FINISHED BY DEPARTMENT OF PUBLIC WORKS.

| | | |
|---------------------------|----------------|-------------------|
| Chas. F. Parker & Co..... | Contract No. 3 | Western Division. |
| Total—1 contract. | | |

TABLE VI.

CONTRACTS PENDING BEFORE THE CANAL BOARD.

| | | |
|---------------------------|-----------------|------------------|
| Andrew Onderdonk..... | Contract No. 28 | Middle Division. |
| Furnaceville Iron Co..... | " 6 | Western " |
| Furnaceville Iron Co..... | " 9 | " " |
| Furnaceville Iron Co..... | " 10 | " " |
| Furnaceville Iron Co..... | " 11 | " " |
| Furnaceville Iron Co..... | " 12 | " " |
| Total—6 contracts. | | |

TABLE VII.

CONTRACTS PENDING BEFORE THE COURT OF CLAIMS.

| | | |
|-----------------------------------|----------------|-------------------|
| Williams, McNaughton & Bapst..... | Contract No. 8 | Western Division. |
| Buffalo Dredging Co..... | " 2 | " " |
| Baker & Banker..... | " 7 | " " |
| Total—3 contracts. | | |

The above lists, Tables V to VII, include all the contracts, 74 in number, under the so-called "9 million" improvement work.

Lake Ontario Harbors for Canal Commerce

STATE OF NEW YORK:

OFFICE OF THE
STATE ENGINEER AND SURVEYOR,
ALBANY, *May 8, 1902.*

EDWARD A. BOND, *State Engineer.*
WM. PIERSON JUDSON, *Deputy State Engineer.*

HON. EDWARD A. BOND, *State Engineer and Surveyor:*

DEAR SIR.—In consideration of the routes for the thousand-ton barge canal from the Hudson River at Albany to the upper lakes at Buffalo, the Mohawk-Oneida-Oswego Rivers via Olcott line is shown at page 52 of your Barge Canal Report of 1901 to cost \$54,700,000 or \$32,000,000 less than the similar enlargement of the present Erie Canal.

This great financial advantage results partly from the lesser number of bridges, but it mainly results from the fact that this line includes navigation of Lake Ontario for 110 miles from the harbor at Oswego to the harbor at Olcott, from which point on Lake Ontario there have been numerous surveys for ship-canal lines to reach Lake Erie at Buffalo.

In connection with the obvious advantages of this open-water navigation, it is desirable to describe the harbors along the south shore of Lake Ontario which would serve as places of refuge for tows of canal-barges of ten feet draft and 1,000 tons capacity using this route.

The south shore of Lake Ontario, in the distance of 110 miles between Olcott and Oswego, has seven United States harbors, including the two first named, and with all of these harbors the writer is familiar, having, as United States Assistant Engineer, made repeated surveys of all of them at various times between 1869 and 1897, while in charge of their works.

In addition to these harbors which are maintained by the general government, there are three lighthouses on points which have no harbors. The safety of boats navigating this

part of Lake Ontario is thus amply provided for, especially in view of the further fact that this portion of Lake Ontario offshore is entirely free from shoals and islands; the open Lake being 400 to 600 feet deep and there being no shoals or islands in it, except a shoal at the mouth of the Niagara River 18 miles west of Olcott, and shoals and islands at the extreme easterly end of the Lake 30 to 50 miles beyond Oswego.

In this connection, the following details of the various Lake Ontario harbors along this route will be of interest:

Olcott Harbor.—Eighteen miles east of the Niagara River and six miles east of Wilson harbor is Olcott harbor; this is formed by two piers each 850 feet long and 200 feet apart, located at the mouth of Eighteen-Mile Creek and having a channel of 180 feet wide, $13\frac{1}{2}$ feet deep at mean lake level, or $11\frac{1}{4}$ feet at extreme low water.

The United States government has expended on this harbor from 1867 to date, \$163,000.

Thirty-Mile Point.—Twelve miles east of Olcott is Thirty-Mile Point lighthouse.

Oak Orchard Harbor.—Fifteen miles further east is Oak Orchard harbor; this consists of two breakwaters and two channel piers, which are 190 feet apart, and extend 1,300 feet into the Lake, to $9\frac{3}{4}$ feet deep at extreme low stage; the space between the piers is two feet deeper than this, so that a limited amount of excavation in the Lake outside the piers will increase the available depth two feet, as well as removing a small 10-foot shoal which lies 800 feet off the entrance. These piers are located at the mouth of Oak Orchard Creek, which has a navigable width of 120 feet and a low water depth of over 12 feet for two miles up-stream from the piers; this channel being sheltered by high wooded banks and affording ample room for boats taking refuge here.

The United States government has expended on this harbor from 1836 to date, \$205,000. A detailed description of the condition of this harbor is last given in the report by the writer from his surveys made in September, 1896, at page 3318 of the

Report of the Chief of Engineers, U. S. A., for 1897, which shows practically the present condition of the harbor.

Braddock's Point.—Twenty-one miles east of Oak Orchard harbor is Braddock's Point lighthouse; at this point the shore of Lake Ontario trends to the southeast towards Charlotte harbor and forms a sheltered area where tows often anchor in the lee of the point.

Charlotte Harbor.—Ten miles to the southeast of Braddock's Point is Charlotte harbor, which is the port of Rochester. This harbor consists of two piers each 3,700 feet long which are 480 feet apart between which there is a natural channel 12 feet deep and 400 feet wide, which is deepened by dredging to 16 feet at extreme low water stage for a width of 150 feet. This is maintained from deep water in the lake to deep water in the Genesee River in which the depth of 16 feet to 27 feet for a width of 300 feet extends $4\frac{1}{2}$ miles up-stream towards Rochester.

The United States government has expended on this harbor from 1828 to date, \$532,000. Detailed map of this harbor, made by the writer from his various surveys from 1870 to 1894, is given at page 2458 of the Report of the Chief of Engineers, U. S. A., for 1894, which map practically shows its present good condition, described at page 3355 of the Report of the Chief of Engineers, U. S. A., for 1901.

Pultneyville Harbor.—Twenty-two miles east of Charlotte is Pultneyville harbor at the mouth of Salmon Creek. This harbor consists of a west breakwater and two channel piers, which are 200 feet apart and extend 560 feet into the lake, and 10-foot depth at extreme low stage. These piers shelter a basin at the mouth of the Creek which has been used by boats of eight-foot draft, being sheltered by a high bank on the west.

The United States government has expended on this harbor from 1870 to date, \$79,000. Detailed map of this harbor, made by the writer from his various surveys from 1870 to 1894, is given at page 2462 of the Report of the Chief of Engineers,

U. S. A., for 1894, which map practically shows its present condition, described at page 3359 of Report of the Chief of Engineers, U. S. A., for 1901.

Great Sodus Harbor.—Ten miles eastward from Pultneyville is Great Sodus harbor which forms the entrance to Great Sodus Bay. It is one of the finest natural harbors on the Great Lakes, having a sheltered deep-water area $2\frac{1}{2}$ miles wide and 3 miles long, with a wharf and with good holding-ground for anchorage. The entrance to this harbor consists of a west breakwater half a mile long and an east breakwater one-third of a mile long, and two piers, each 1,500 feet long, which are 470 feet apart, between which a channel 1,800 feet long and 200 feet wide, with 15-foot depth at extreme low water, is maintained by annual dredging from deep water in the Bay to deep water in the Lake.

The United States government has expended on this harbor from 1828 to date, \$490,000. Detailed map of this harbor, made by the writer from his various surveys from 1870 to 1894, is given at page 2468 of the Report of the Chief of Engineers, U. S. A., for 1894, which map practically shows its present condition, described at page 3360 of Report of the Chief of Engineers, U. S. A., for 1901.

Little Sodus Harbor.—Fifteen miles east of Great Sodus harbor and midway between Great Sodus and Oswego is Little Sodus harbor, which forms the entrance to Little Sodus or Fair Haven Bay. This Bay is practically as fine a harbor as Great Sodus, although not as large, having a deep-water area of two miles long and three-quarters of a mile wide, with wharf and with good holding-ground for anchorage.

The entrance to this harbor consists of two breakwaters; the west one 470 feet long and the east one 1,850 feet long, with two piers each about 1,700 feet long which are 250 feet apart, between which a channel 2,300 feet long and 15 feet deep at extreme low water is maintained by occasional dredging from deep water in the Lake to deep water in the Bay.

The United States government has expended on this harbor from 1852 to date, \$338,000. Detailed description of this harbor is given at page 2470 of the Report of the Chief of Engineers, U. S. A., for 1894; its present condition being described at page 3363, Report of the Chief of Engineers, U. S. A., for 1901.

Oswego Harbor.—Thirteen miles northeast of Little Sodus harbor is Oswego harbor, which is the principal port of Lake Ontario. This harbor consists of the mouth of the Oswego River which has been deepened and improved by the government, and of the outer harbor sheltered by a breakwater over a mile in length, furnishing ample shelter for vessels. The entrance to the River and to the inner harbor is sheltered by a west breakwater 1,500 feet long; a lighthouse pier 400 feet long and an east breakwater 750 feet long with an entrance of 357 feet width between them, through which a channel 15 feet deep is maintained from deep water in the Lake to the sheltered wharves inside. The outer breakwater is 6,000 feet long, has a lighthouse at its eastern end, and shelters an area of 100 acres, with depth from 9 feet to 18 feet at extreme low level, having wharves and mooring-places.

The United States government has expended on this harbor from 1826 to date, \$1,973,000. Detailed description of this harbor and a detailed map of it made by the writer from his various surveys, from 1869 to 1895, are given at page 3216 of the Report of the Chief of Engineers, U. S. A., for 1895; its present condition being described at page 3365 of Report of the Chief of Engineers, U. S. A., for 1901.

Lake Ontario Commerce.—The traffic on Lake Ontario has decreased during recent years to such extent that the government has partially discontinued the maintenance of four of the eight harbors which have above been mentioned, namely, Wilson, Olcott, Oak Orchard and Pultneyville, at which places maintenance can, of course, be resumed at any time when there should be need for it.

The creation of this canal route by way of Lake Ontario would in no way contribute to the Canadian commerce by way of the St. Lawrence, but would solely benefit the commerce of New York State by way of the Hudson River to New York. That it would not benefit Canadian commerce is evident when it is considered that the Canadians already have the Welland Canal with two feet greater depth and with much larger locks than proposed, by which commerce now has full access to the St. Lawrence route.

From a common point in Lake Erie, 17 miles up the lake from Buffalo and opposite to the entrance to the Welland Canal, the distance to be traversed to a common point in Lake Ontario opposite to Olcott is practically the same, being 66 statute miles by way of the Welland Canal, and 63 statute miles by way of the Niagara River and the proposed Barge Canal and Olcott.

Lake Navigation.—It has already been proven by actual experience that 240-ton boats, built to navigate the present Erie Canal, can safely be towed on Lake Erie and can be used in traffic from the ports on Lake Erie to Buffalo. This fact being established, it is evident that boats for the proposed 1,000-ton Barge Canal, being four times as large as the present Erie Canal boats, can with equal or greater safety navigate Lake Ontario, which is more favorable for navigation than Lake Erie; Lake Erie being comparatively shallow, 40 to 90 feet in depth, and more quickly disturbed by storm, while Lake Ontario is 400 to 600 feet deep and less easily affected.

With the numerous harbors which have been described, there is no question that 1,000-ton Barge Canal boats can be towed with safety during the canal season (April-November) through Lake Ontario to Oswego, from which the greater part of the route to the Hudson River will lie through the open waters of the Oswego and Oneida Rivers, Oneida Lake and the Mohawk River.

Reference has been made to the relative depths of the Lakes and to their elevations above the sea, which are approximately

shown upon the accompanying section from the head of Lake Superior to tidewater.

It is worthy of consideration that when it is undertaken to enlarge the Erie Canal by way of Oneida Lake and the Oneida and Seneca Rivers to Buffalo, such enlargement will take many years as well as many millions; meantime by merely enlarging the Oswego Canal and Oswego River for 20 miles from Three-River Point down to Oswego, commerce can use this route and get into Lake Erie by way of the Welland Canal many years before they will be able to use the other route through the center of the State.

Very truly yours,

WM. PIERSON JUDSON,
Deputy State Engineer of New York.



By the second article of the Treaty of Paris, 1783, the boundaries of the United States were described thus:

"From the northwest angle of Nova Scotia, viz., that angle which is formed by a line drawn due north from the source of Saint Croix River to the Highlands; along the said Highlands which divide those rivers which empty themselves into the river St. Lawrence, from those which fall into the Atlantic Ocean; to the northwesternmost head of Connecticut River; thence down along the middle of that river, to the forty-fifth degree of north latitude; from thence by a line due west on said latitude, until it strikes the river Iroquois or Cataraquay."

By the fifth article of the Treaty of Ghent, 1814, the description contained in the above treaty, as regards the eastern portion of the land boundary from the source of the St. Croix to the St. Lawrence River, was confirmed, and provision was made for the appointment of commissioners to survey and mark the line.

The commissioners appointed under this article failed to agree. Besides the difficulties in interpretation which arose relative to the "North West Angle of Nova Scotia," and the "Highlands," and which were the subject of controversy for more than twenty years afterwards, the commissioners found that the line surveyed and laid out by Valentine and Collins did not coincide with the 45th parallel. It was 151 feet north of it at the St. Lawrence River; it crossed the parallel southward four miles east of the St. Lawrence, running 2,506 feet south of it at $17\frac{1}{2}$ miles east of the St. Lawrence; again crossing the parallel to the northward at 35 miles east of the St. Lawrence, it was 4,200 feet north of it at the outlet of Lake Champlain.

The commissioners having reported their failure to agree upon any part of the eastern portion of the land boundary, further negotiations were entered into by the two governments, resulting in the reference of the matter to the King of the Netherlands, by Treaty of 1827.

The award under this treaty, given on January 10, 1831, as regards the New York and Vermont part of the line, again designated the 45th parallel, but with a diversion to the north

at the west side of the Richelieu River, so as to include in New York Fort Montgomery, which had been erected by the United States north of the true parallel, but south of the Valentine and Collins line, which at this point was 4,200 feet north of latitude 45°.

The award of the King of the Netherlands having been rejected, the question was again opened up and was not finally settled until the Treaty of 9th August, 1842.

By this treaty the line of Valentine and Collins was reverted to as the international boundary.

In 1843 Lt.-Col. Estcourt and Mr. Albert Smith were appointed commissioners under article I of the Treaty of 1842 to survey and mark the boundary from the source of the St. Croix to the St. Lawrence River. They laid down the New York portion of the boundary in the year 1845. Their final joint report was dated 28th June, 1847. They marked the line with cast iron monuments, a description of which will be found in the annexed report of Messrs. Bigger & Willis. The commissioners, with their report, filed plans and field notes of their survey. Certified copies of these field notes were procured by us, for use in our operations, in March last from the War Department in Washington, where the originals are on record, together with copies of a tabular statement showing the deflection angles and distances between monuments with the data procured by Lieut. Thom, U. S. A., from a resurvey made in 1851.

The Laws of New York, Chapter 421 of 1887, Section 2, provide for an examination in that year, and every three years thereafter, under the direction of the State Engineer and Surveyor, of all monuments on the boundary lines of the State, and also for a replacing and resetting, in co-operation with the authorities of adjacent States, of such monuments as may be found injured or displaced.

Under this law, examinations of the monuments along the Canadian boundary have been made every three years since 1887. The examination of 1890 was participated in by an officer appointed by the Government of Canada.

While very serious deterioration of the monuments placed in 1845 was then observed, subsequent examinations showed progressive falling off in their condition until the necessity of repair or renewal of the monuments became urgent.

In 1899, Mr. Bond, State Engineer and Surveyor of New York, called the attention of the Government of Canada, through the Minister of the Interior, to the matter, suggesting another joint examination. Subsequently, the Governor of the State of New York, at the instance of the State Engineer, wrote to the Secretary of State of the United States, stating the necessities of the case.

The Canadian Government was unwilling to enter upon an examination of the monuments, without provision for their renewal where found necessary, and this, it was thought, could not properly be undertaken except in conjunction with the United States Government.

In May, 1900, the Government of Canada, by minute of Council, proposed, through the usual diplomatic channels, a joint examination and repair of monuments along the whole of the boundary line between the United States and Canada.

The United States Government did not, at the time, accede to this proposal; but, in October, 1890, the Secretary of State transmitted, through the British Ambassador, the proposal of the State of New York, with an expression of his concurrence in the same.

On January 5, 1901, the Government of Canada expressed their willingness to co-operate with the State of New York, now that the agreement of the United States Government had been secured, but suggesting that the scope of the proposed operations be enlarged so as to cover the whole of the eastern part of the boundary.

On July 15, 1901, the Secretary of State of the United States, at the request of the Governor of New York, again brought the matter to the attention of the British Ambassador, stating the necessity of speedy action, and on August 16th, the Government of Canada replied by Minute acceding to the proposal.



Granite monument set in 1902, No. 683.
New York and Canada boundary line.

At the beginning of September, Mr. Bond was authorized by the Governor of the State to open negotiations with the Department of the Interior of Canada, and, on the 28th of that month, the Canadian Government appointed Mr. W. F. King as their commissioner, with authority to make arrangements for the prosecution of the field work.

The Commissioners thus appointed decided, before proceeding with the replacing of the monuments, to have a careful examination of the existing monuments made, and for that purpose, and for such further field operations as should be found necessary, appointed representatives; the State Engineer appointing Mr. H. P. Willis, of Schenectady, and the Canadian Commissioner, Mr. C. A. Bigger, of Ottawa, in October, 1901.

These gentlemen went over the line in October and November, 1901. After consideration of their report, it was thought advisable to replace all the old monuments by new ones. After considering various forms of iron or steel monuments, we decided to adopt granite with concrete base, and also to make a precise survey of the whole line.

Tenders were called for, both in Canada and the United States, for the construction of these monuments, to be delivered at certain railway stations near the work on or before March 1, 1902. The tenders were opened on January 5, 1902, and the contract was awarded to E. R. Fletcher, of Hardwick, Vermont, whose tender was the lowest.

The monuments are 6 feet in length, the lower portion of the stone having an ashlar face, 12 inches square, for one foot of its length. From this point for a distance of 4 feet $7\frac{1}{2}$ inches, the stone tapers from 12 inches to 9 inches on each side, with each corner having a bevelled face of $\frac{1}{2}$ inch wide. The remaining $4\frac{1}{2}$ inches at the top is dressed in the form of a pyramid.

It was decided that they should be set in concrete bases, 3 feet square, and averaging 4 feet 6 inches in the ground and 9 inches above the surface. One foot of the granite stone was embedded in the concrete. The upper surface of the concrete was given

a slope to turn rain, and on it was imprinted the lettering, as follows:

On the south side..... " U. S."
On the north side..... " Canada "
On the west side " Treaty 1842 "
On the east side..... the number of the monument with
" Renewed 1902 "

In the case of the new monuments, the word "renewed" was omitted, and the letter A followed the number.

The actual field work was begun by Messrs. Bigger and Willis on June 3d, near Rouse's Point, and the last monument was set on or about the 12th of October. The line survey continued later, and some of the astronomical work yet remains to be done. A full account of the field work will be found in the annexed report by Messrs. Bigger and Willis.

We recommend that the new monuments be accepted as marking the true line between Canada and the United States, as under the first article of the Treaty of August 9, 1842. We further recommend that periodical inspections, with repair if necessary, be made jointly by the Government of the United States and Canada.

Copies of correspondence relating to the agreement under which our work was done, diagram showing the form and dimensions of the new monuments, and copy of the report of Messrs. Bigger and Willis, are submitted herewith.

Signed in duplicate at Albany, in the State of New York, this 10th day of January, 1903.

EDWARD A. BOND,
State Engineer and Surveyor.

W. F. KING,
Chief Astronomer.



Granite monument set in 1902, No. 749.
New York and Canada boundary line.

Correspondence.

NEW YORK AND CANADA BOUNDARY LINE.

STATE OF NEW YORK.

OFFICE OF THE STATE ENGINEER AND SURVEYOR,

ALBANY, May 9th, 1899.

SURVEYOR-GENERAL, *Department of the Interior, Technical Branch,*
Ottawa, Canada.

SIR.—I beg leave to call your attention to the law relating to the monuments marking the boundary lines of our State,—a copy of which I enclose—This law requires that an examination and inspection of the boundary line monuments shall be made during the present year, and I earnestly solicit your co-operation with us in such examination and inspection.

We now have an appropriation for this purpose and would gladly put the necessary party in the field, to co-operate with such persons as are designated by your Department, on short notice, if you will let me know what your wishes are in this matter.

Very respectfully yours,

(Signed) EDWARD A BOND,
State Engineer and Surveyor.

DEPARTMENT OF THE INTERIOR.

TOPOGRAPHICAL SURVEYS BRANCH,

OTTAWA, May 15, 1899.

SIR.—I have the honour to acknowledge the receipt of your letter of the 9th instant, inviting the co-operation of our Government in the examination and inspection of the monuments marking the boundary line between Canada and the State of New York. I have submitted your invitation for instructions and will advise you later.

I have the honour to be, Sir, Your obedient servant,

(Signed) E. DEVILLE
Surveyor-General.

EDWARD A. BOND, Esq.,
State Engineer and Surveyor,
Albany, N. Y., U. S. A.

REPORT OF STATE ENGINEER.

STATE OF NEW YORK.

OFFICE OF THE STATE ENGINEER AND SURVEYOR,

ALBANY, March 2d, 1900.

HON. E. DEVILLE, *Surveyor-General, Dept. of Interior, Topographic Survey Branch, Ottawa, Ca.*

DEAR SIR.—From May 15th to June 30th, 1899, we held some correspondence in relation to the examination of the monuments marking the boundary line between Canada and the State of New York. Our law stipulates that the State Engineer and Surveyor shall make an examination of the State boundary monuments once in three years. The time has arrived when the monuments between Canada and the State of New York, by the terms of our Statute, should be examined.

It would please me very much if a representative of your Government could take this matter at the same time so that each party will know of any defective monuments and also know of any repairs to monuments that ought to be made.

I should be very glad if you will take this subject up with the proper parties and let me know at an early date what the possibilities are of co-operation by your department with ours in this examination.

Very truly yours,

EDWARD A. BOND,

State Engineer and Surveyor.

Ref. 568,174 on 78,422.

EXTRACT FROM A REPORT OF THE COMMITTEE OF THE HONOURABLE
THE PRIVY COUNCIL, APPROVED BY HIS EXCELLENCY ON THE 26TH
MAY, 1900.

P. C. 1298.

On a Report dated 12th May, 1900, from the Acting Minister of the Interior, stating that he has received a communication from the State Engineer and Surveyor of the State of New York, stating that he is required under their law to make every three years an examination of the monuments marking the boundary of his State, and that the time for the periodical examination is at hand, and asking the co-operation of the Government of Canada so far as regards that portion of the State boundary which coincides with the boundary of the Dominion.

The Minister observes with regard to this proposition that it looks to a mere examination of the monuments, and not the repair or replacing of those broken or lost. This last would be out of the power of the State of New York or of Canada, either separately or jointly without an international agreement with the United States. Without power to replace, the examination would appear to be of little service to the Dominion. For this reason, he (the Minister) is unable to recommend compliance with the State Engineer's request.

The Minister would, however, call attention to the general question of which this is a part, namely, the examination and where necessary,

the re-marking of the whole of the southern boundary of Canada, wherever it has been surveyed by the various commissions appointed for that purpose. The portions of the boundary line which have been so marked are:

From the St. Croix to the St. Lawrence River, separating the Provinces of New Brunswick and Quebec from the States of Maine, New Hampshire, Vermont and New York; this line was surveyed under the Ashburton Treaty of 1842 and marked with cast iron monuments.

From the Lake of the Woods to the Rocky Mountains (49th parallel), separating Manitoba and the North-West Territories from the States of Minnesota, North Dakota and Montana; surveyed 1872 to 1874 and marked, in part with iron monuments, in part with earth or stone mounds.

From the Rocky Mountains to the Straits of Georgia (49th parallel), separating British Columbia from the States of Montana, Idaho and Washington; surveyed 1859 to 1861, and marked with mounds and iron posts.

As regards all these portions of the line many complaints have been made from time to time of the disappearance of monuments and the consequent difficulty of determining the exact position of the boundary, while the British Columbia portion of the line was, in November, 1892, the subject of a formal request by the Lieutenant-Governor in Council for not only a re-establishment of lost posts but also for an additional or supplementary survey, on the ground that the demarcation by the Commissioners was not sufficiently complete for modern requirements.

Again, the boundary line between Ontario and Minnesota, between Lake Superior and Lake of the Woods, has been designated by the Commissioners under the Treaty of Ghent, and by the Ashburton Treaty, by description and maps only, and the line (which in general follows the water communication) has never been marked where it crosses the portages.

The Minister submits that while this question was one of those before the Joint High Commission, it is yet essentially different from the other questions before that Commission, as it involves no cession of territory or relinquishment of rights on either side, but is a matter of purely business arrangement to the mutual advantage of both countries.

The Minister, therefore, recommends that Your Excellency be moved to inform Her Majesty's Government of the desire of the Government of Canada to join with the United States in an examination of their common boundary for the purpose of re-establishing lost monuments and of placing such supplementary monuments as may appear necessary to meet modern requirements.

The Committee advise that Your Excellency be moved to transmit a certified copy of this Minute to the Right Honourable the Secretary of State for the Colonies.

All which is respectfully submitted for Your Excellency's approval.

(Signed) JOHN J. McGEE,
Clerk of the Privy Council.

To the Honorable the Minister of the Interior.

REPORT OF STATE ENGINEER.

STATE OF NEW YORK,

OFFICE OF THE STATE ENGINEER AND SURVEYOR,

ALBANY, October 23, 1900.

SUBJECT — NEW YORK-CANADA BOUNDARY MONUMENTS.

HON. JOHN HAY, *Secretary of State, Washington, D. C.:*

DEAR SIR.— By the laws of the State of New York, it devolves on the State Engineer and Surveyor to once in three years examine all of the boundary monuments of the State and report to the Legislature their condition, and in connection with this work I have had the boundary monuments between Canada and the State of New York examined this past summer.

Of a total of 130 monuments I find only 37 in perfect condition; I find 4 are missing, 13 are broken, or have pieces broken off, 8 have fallen down, 5 have cracked, 39 have been heaved by action of the frost, 24 lean, that is, are not plumb. Of these some of them are firm and others loose.

I would be glad if you would tell me what is best to be done to induce the Canada government to join, either with the government of the United States or with our State, to have these monuments replaced and put in proper and first-class condition.

If your department will take it up with the Canadians, I shall be very glad; but, if not, and they will assent to joining my department in adjusting this matter, we will gladly attend to it.

If I have not addressed the right department, I would appreciate it very much if you would have this letter referred to the proper parties.

Very truly yours,

(Signed) EDWARD A. BOND,
State Engineer and Surveyor.

DEPARTMENT OF STATE,

WASHINGTON, October 29, 1900.

EDWARD A. BOND, ESQUIRE, *State Engineer and Surveyor, Albany, N. Y.:*

SIR.— I have to acknowledge the receipt of your letter of the 23d instant, in relation to the condition of the boundary monuments between the State of New York and the Dominion of Canada.

I have submitted the matter to the British ambassador with a view to ascertain whether the Canadian government will be willing to join in the replacing and repair of the monuments. As a new survey is not involved, but simply the repair of existing monuments, it would not seem to require any new convention, but merely provision on both sides for the joint performance of the work.

I am, sir, your obedient servant,

(Signed) JOHN HAY.

Ref. 608,343 on 78,422.

EXTRACT FROM A REPORT OF THE COMMITTEE OF THE HONOURABLE
THE PRIVY COUNCIL, APPROVED BY HIS EXCELLENCY ON THE
5TH JANUARY, 1901.

P. C. No. 483 L.

The Committee of the Privy Council have had under consideration a copy of a Despatch, hereto attached, dated 1st November, 1900, from Her Majesty's Ambassador, at Washington, transmitting a copy of a Note from the Secretary of State of the United States, enquiring whether the Government of Canada is willing to join in having the monuments upon the boundary line between Canada and the State of New York put in proper and first-class condition.

The Minister of the Interior to whom the matter was referred, observes that Your Excellency's Government has already, by Minute dated 26th May, 1900, expressed its willingness and desire to join with the Government of the United States in the examination and repair of monuments upon the boundary between Canada and the United States.

The Minister further states that the occasion for the above mentioned Minute was an invitation on the part of the Authorities of the State of New York to the Government of Canada to join with them in an examination of the northern boundary of their State, where it abuts upon the Province of Quebec. This proposal Your Excellency's advisers declined to accede to, for the reason that the mere examination of the monuments would not serve any very practical end, unless provision were made for the restoration of lost or broken monuments, a matter which could not be dealt with except with the consent and co-operation of the Government of the United States.

The Minister further states that this objection is now set aside by the note of the United States' Secretary of State. Although the note indicates the agreement of the United States as regards only a small part of the work proposed by Your Excellency's Government and a more extended agreement would be more satisfactory, he is of the opinion that concurrence in the limited proposal is in the public interest.

The Minister further observes that it appears that of 130 monuments originally placed on the New York boundary, 37 are now in first-class condition, whereas in 1890 an examination of this line by an officer of the Department of the Interior showed 51. The rapid deterioration of the monuments thus apparently not only calls for early action towards their restoration, but also indicates the probable condition of the monuments on the prolongation eastward of this line, north of the States of Vermont, New Hampshire and Maine, and suggests the advisability of action there also.

The Committee, on the recommendation of the Minister of the Interior advise that Your Excellency be moved to inform Her Majesty's Ambassador at Washington that the Government of Canada is willing to join with the Government of the United States in the examination and restoration, where necessary, of the monuments along the line between

REPORT OF STATE ENGINEER.

the Province of Quebec and the State of New York, but desires to suggest that the scope of the proposed joint operations be enlarged so as to cover the whole of the boundary line, which was marked under the Webster-Ashburton Treaty, from the St. Lawrence to the St. Croix River.

All of which is respectfully submitted for your Excellency's approval.

(Signed) JOHN J. MCGEE,

Clerk of the Privy Council.

To the Honourable The Minister of the Interior.

STATE OF NEW YORK,

EXECUTIVE CHAMBER,

ALBANY, August 5, 1901.

HON. E. A. BOND, *State Engineer, Albany, N. Y.:*

DEAR SIR.—The enclosed letter from the Department of State at Washington is forwarded to you for your information.

Yours very truly,

(Signed) B. B. ODELL, JR.

DEPARTMENT OF STATE,

WASHINGTON, August 3, 1901.

His Excellency The Governor of New York, Albany:

SIR.—I have the honor to acknowledge the receipt of your letter of the 23rd ultimo, enclosing one to yourself from the State Engineer of New York requesting to be put in direct communication with the proper officials of the Government of the Dominion of Canada for the purpose of undertaking at once, conjointly with them, the placing of new monuments to mark the boundary between the State and the Dominion,

As Mr. Bond is aware, the Department submitted to the British Embassy his suggestion that this matter be undertaken now without first waiting until the States of Vermont, New Hampshire and Maine should also have agreed to mark anew their respective boundaries with Canada. To that note no reply has yet been received; and until a favorable answer is given, this Department thinks it is hardly in a position to bring the engineers of New York and Canada into direct communication for the purpose stated. But it will be glad to do so when the proper time shall have arrived.

I have the honor to be, Sir, your obedient servant,

(Signed) ALVEY A. ADEE,

Acting Secretary.

Ref. 650,823 on 78,422.

EXTRACT FROM A REPORT OF THE COMMITTEE OF THE HONOURABLE THE
PRIVY COUNCIL, APPROVED BY HIS EXCELLENCY ON THE 16TH
AUGUST, 1901.

P. C. No. 803 L.

Dispatch, July 17.

Note, S. of S., U. S. July 15.

Despatch, Jan 12.

The Committee of the Privy Council have had under consideration a Despatch, hereto attached, dated July 17th, 1901, from His Majesty's Charge d'Affaires at Washington, transmitting a copy of a note from the Secretary of State of the United States having reference to the condition of the monuments on the boundary between Canada and the State of New York, and suggesting that in view of the simplicity of the task of executing the necessary repairs, these should be carried out by the direct co-operation of the Department of the Interior of Canada with that of the Engineer of the State of New York, without awaiting the conclusion of any future agreement between His Majesty's Government and the United States Government for the more effective demarcation of the frontier.

The Minister of the Interior, to whom the said despatch was referred, submits that the proposed co-operation with the State of New York, with the concurrence of the Government of the United States, is quite in accord with the views expressed by His Excellency's advisers in the Minutes of Council of the 26th May, 1900, and 5th January, 1901, although the scope of the proposed operations is restricted to the limits of the State of New York, and, as set forth in these Minutes, an inquiry into the condition of the whole land boundary between the United States and Canada is to be desired.

The Committee advise that His Excellency be moved to inform His Majesty's Charge d'Affaires at Washington, of the concurrence of the Government of Canada with the proposal of the Secretary of State of the United States, it being understood that the agreement to the proposed co-operation is without prejudice to any further agreement between the two Governments for the more effective demarcation of the existing treaty boundary in that quarter, and that, while each government shall pay the expenses of its Commissioners and surveyors, the actual cost of repairs shall be equally divided.

All which is respectfully submitted for His Excellency's approval.

(Signed)

JOHN J. MCGEE,

Clerk of the Privy Council.

To the Honourable, The Minister of the Interior.

REPORT OF STATE ENGINEER.

With P. C. No. 803 L.,—1901; Ref. 650,823 on 78,422.

No. 80.

MR. LOWTHER TO LORD MINTO.

BRITISH EMBASSY,

NEWPORT, R. I. *July 17, 1901.*

MY LORD.—With reference to Lord Pauncefote's despatch, No. 3, of January 12 last, I have the honour to transmit to Your Excellency herewith a copy of a further note from the United States Government, drawing attention to the danger of obliteration of the boundary between Canada and the State of New York through the dilapidation of the monuments, and suggesting that, in view of the simplicity of the task of executing the necessary repairs, it should be carried out by the direct co-operation of the Department of the Interior of Canada with that of the Engineer of the State of New York, without awaiting the conclusion of any further agreement between His Majesty's Government and the United States Government for the more effective demarcation of the frontier, such as that which, it is hoped, may result from the survey suggested by the latter last January and communicated to Your Excellency in Lord Pauncefote's despatch, No. 13.

I should be grateful if Your Excellency would be good enough to inform me what answer I should return to the proposal of the United States Government.

I have, &c.,

(Signed)

GERARD LOWTHER.

His Excellency,

THE EARL OF MINTO, G.C.M.G.,

&c., &c., &c.

No. 2206.

DEPARTMENT OF STATE,

WASHINGTON, *July 15, 1901.*

SIR.—I have the honour to inform you that the Department is in receipt of a letter from the Governor of New York, dated the 14th ultimo, in which he says that the State Engineer has called his attention to correspondence that the latter has had with the Department of the Interior of the Dominion of Canada in relation to replacing and repairing the monuments that mark the boundary line between the State of New York and the Dominion of Canada. The State Engineer informs the Governor that the monuments are in such a fragile and broken condition that unless they are replaced very soon by more permanent ones the boundary line may be lost.

The Governor requests that the matter may be brought to the attention of the British Ambassador with a view to having early action taken to repair and replace the dilapidated monuments.

In this connection I beg to recall to your attention the proposal contained in the Department's note to Lord Pauncefote of October 29, 1900.

While the Department still adheres to the view expressed in its note of January 29, 1901, in which it is gratified to see that the Government of the Dominion of Canada shares that a general survey of the whole land and water boundary between the two countries, with a view to replacing lost monuments and erecting new ones, as well as determining by buoys or ranges, or both, the water boundaries in the narrow lake channels, is most desirable, the question presented on the New York boundary is of so simple a nature that it is conceived that no difficulty will be found in carrying out, forthwith, the suggestion of the Governor of the State. There is no question of settling any dispute arising from the total disappearance of old monuments or the insufficient marking of the line by the treaty commissioners. It is merely a matter of repairing existing line-marks, as to the situation of which no question of doubt can arise.

It is not thought that an international convention would be necessary to provide for painting iron monuments, cementing the defective masonry of stone monuments, restoring inscriptions obliterated by exposure to the elements, or, in short executing all such mere repairs as may be needful to enable the line marks to subserve the purpose for which they were set up. All this can be done by the joint action of the appropriate agents of the Engineer's Department of the State of New York and of the Department of the Interior of Canada, without prejudice to any future agreement between the two Governments for the more effective demarcation—if need be—of the existing treaty boundary in that quarter.

It is hoped that an early and favourable consideration may be given to this proposal.

I have, &c.,

(Signed)

JOHN HAY.

MR. GERARD A. LOWTHER,
&c., &c., &c.

LORD PAUNCEFOTE TO LORD MINTO.

BRITISH EMBASSY,

WASHINGTON, *January 12, 1901.*

MY LORD.—I have the honour to acknowledge the receipt of Your excellency's despatch, No. 6, of the 9th instant, inclosing a copy of an approved Minute of the Privy Council for Canada, intimating the willingness of the Canadian Government to join with the Government of the United States in the examination and restoration, where necessary, of the Monuments along the line between the Province of Quebec and the State of New York, but suggesting the extension of the proposed joint operation so as to include the whole of the boundary line marked under the Webster-Ashburton Treaty, from the St. Lawrence to the St. Croix River.

REPORT OF STATE ENGINEER.

I have forwarded the Minute to the United States Government with the request that I may be informed of their views on the suggestion therein contained for communication to Your Excellency.

I have, &c.,

His Excellency (Signed) PAUNCEFOTE,
THE EARL OF MINTO, G.C.M.G.,
&c., &c., &c.
The Governor General.

STATE OF NEW YORK,

EXECUTIVE CHAMBER,

ALBANY, Sept. 2, 1901.

HON. E. A. BOND, *State Engineer, Albany, N. Y.:*

DEAR SIR.—I am directed by the Governor to refer the enclosed communication to you for your consideration.

Very truly yours,

(Signed) JAS. G. GRAHAM,
Secretary to the Governor.

DEPARTMENT OF STATE,

WASHINGTON, August 30, 1901.

His Excellency, The Governor of New York, Albany.:

SIR.—Referring to your letter of the 23rd ultimo, I have now the honor to inform you that on the 25th instant the British Charge d'Affairs ad interim advised me that the Privy Council of Canada concurred in your proposal that the restoration of defective monuments marking the boundary between New York and Canada be proceeded with under the joint direction of the State Engineer of New York and the Canadian Department of the Interior, without awaiting the conclusion of a more formal agreement between this Government and that of Great Britain.

The Canadian Government wishes it to be understood, however, that this agreement is without prejudice to any further measures which may be taken for the demarcation of the boundary between the two countries, and that, while each Government shall pay the expenses of its commissioner and surveyors, the actual cost of restoring the monuments shall be equally divided.

I would now request you to put the State Engineer of New York in direct communication with the Canadian Department of the Interior.

I have the honor to be, Sir, your obedient servant,

(Signed) ALVEY A. ADEE,
Acting Secretary.

STATE OF NEW YORK,

OFFICE OF THE STATE ENGINEER AND SURVEYOR.

SUBJECT — EXAMINATION AND REPAIR OF BOUNDARY LINE
MONUMENTS.

ALBANY, *September 4th, 1901.*

HON. B. B. ODELL, JR., *Governor State of New York, Albany, N. Y.:*

MY DEAR SIR.— I am in receipt of your letter of September 2nd, enclosing a letter from Hon. Alvey A. Adee, Acting Secretary, in relation to the examination and repair of boundary monuments between New York and Canada, and have taken up the subject with the Canadian Department of the Interior, as suggested in Mr. Adee's letter.

Very truly yours,

(Signed) EDWARD A. BOND,
State Engineer and Surveyor.

STATE OF NEW YORK.

OFFICE OF THE STATE ENGINEER AND SURVEYOR.

SUBJECT — EXAMINATION AND REPAIR OF BOUNDARY LINE
MONUMENTS.

ALBANY, *September 4th, 1901.*

HON. E. DEVILLE, *Surveyor-General, Department of the Interior, Ottawa Canada.:*

DEAR SIR.— You will doubtless recall some correspondence which we had recently with relation to the examination and repair of monuments marking the boundary line between the Dominion of Canada and the State of New York.

During the present year the matter has been the subject of correspondence between the Governor of this State, the Secretary of State at Washington and the representatives of your Government, and I am now in receipt of a letter under date of August 30th, 1901, from Hon. Alvey A. Adee, Acting Secretary of State (a copy of which is herewith enclosed), transmitted to me by Governor Odell.

In accordance with the suggestion contained in the letter above mentioned, I have the honor to call your attention to this matter, hoping that arrangements can be perfected so that the examination and repair of these monuments can be made at as early a date as is possible, especially in view of the fact that the season in which outdoor work can be conducted is now rapidly drawing to a close.

My understanding is that each Government shall pay the expenses of its engineers, while the actual cost of restoring the monuments shall be equally divided between the two Governments.

In 1900 an agreement was entered into between the State of New York and the State of Pennsylvania for the examination and repair of monuments between the two States on similar terms, and, in view of

REPORT OF STATE ENGINEER.

that fact, I take the liberty of enclosing herewith a copy of that agreement, as I believe, with such modifications as might be made necessary in paragraph 2, the general form of the agreement would cover the work contemplated in reference to the boundary line monuments between Canada and New York. I offer this merely as a suggestion, however, and will be glad to arrange the matter in such way as you desire, either by formal agreement or by exchange of letters.

Awaiting your reply, I am, very truly yours,

(Signed) EDWARD A. BOND,
State Engineer and Surveyor.

Ref. 656,222 on 78,422.

EXTRACT FROM A REPORT OF THE COMMITTEE OF THE HONOURABLE THE
PRIVY COUNCIL, APPROVED BY HIS EXCELLENCY ON THE 28TH
SEPTEMBER, 1901.

P. C. No. 1819.

British Embassy, A. A. Ade. Agreement.

On a Report dated 17th September, 1901, from the Minister of the Interior, submitting with reference to the proposal that the Government of Canada should join with that of the State of New York in an examination of their common boundary, with a view to the restoration of destroyed or damaged monuments, that a communication has recently been received from the State Engineer and Surveyor of the State of New York, proposing that a formal working agreement as to the details of the work and a division of the expenses be entered into between the Governments of Canada and the State of New York, or by officials designated by those governments; he submits, as a convenient form for agreement, the agreement entered into for a like purpose in the year 1900 between the States of New York and Pennsylvania.

The Minister, seeing no objection to an agreement of the character proposed, recommends that Mr. W. F. King, the Chief Astronomer of the Department of the Interior, who is familiar with this question, be appointed Commissioner to act with the officer who may be delegated by the State of New York, with authority to enter into an agreement of the character above mentioned, and to make arrangements for the commencement of field operations before autumn is too far advanced.

The Committee submit the same for His Excellency's approval.

(Signed) JOHN J. McGEE,
Clerk of the Privy Council.

To the Honourable
The Minister of the Interior.

BRITISH EMBASSY.

NEWPORT, R. I., September 2, 1901.

MY LORD:—With reference to Your Excellency's despatch No. 70 of the 20th ultimo I have the honor to transmit herewith a copy of a note I have received from the United States Government.

Mr. Adee states that he has made known to the Government of New York the assent of Your Excellency's Government to the proposal that the restoration of the monuments on the boundary between New York and Canada be undertaken without awaiting the conclusion of a formal agreement between the Governments of Great Britain and the United States, and Mr. Adee adds that he has asked the Governor to put the Engineer of the State in communication with the Canadian Department of the Interior.

I have, &c.,

(Sd.) GERARD LOWTHER.

His Excellency

The EARL OF MINTO, G.C.M.G.,

&c., &c., &c.,

The Governor General.

No. 2247.

DEPARTMENT OF STATE.

WASHINGTON, August 30th, 1901.

SIR.—I have the honour to acknowledge with gratification the receipt of your note No. 232 of the 25th instant, informing me of the assent of the Canadian Government to the proposal of the Governor of New York that the restoration of the monuments on the boundary between New York and Canada be undertaken without awaiting the conclusion of a formal agreement between this Government and that of Great Britain.

I have made this known to the Governor of New York and have asked him to put the Engineer of the State in communication with the Canadian Department of the Interior.

I have, &c.,

(Sd.) ALVEY A. ADEE,

Acting Secretary.

Mr. GERARD LOWTHER,

&c., &c., &c.

With P. C. No. 1819-1901; Ref. 656,222 on 78,422.

Whereas, by virtue of the provisions of chapter 421, of the Laws of the State of New York, the State Engineer and Surveyor is authorized and required, during the year 1887, and every third year thereafter, to cause to be made an examination and inspection of the boundary line monuments between that State and other States adjoining, and is further required to make a detailed report of such inspection and examination; and is further authorized and required to co-operate with the proper authorities of such adjoining States, in the examination and inspection and in the restoring and replacing of boundary line monuments, where they need to be restored or replaced, and is clothed with full authority to represent the State of New York in co-operating with other States in discharging the duties hereinbefore referred to regarding boundary line monuments; and

Whereas, similar duties are imposed upon the Secretary of Internal Affairs of the Commonwealth of Pennsylvania, by the second section of the Act of the General Assembly, approved May 4, 1889, entitled "An Act relative to the boundary lines and boundary line monuments," directing his co-operation with the proper authorities in any of the adjoining States in re-establishing, by surveys and otherwise, of the boundary lines, the erection of new monuments to mark their location, the repairing, resetting or renewing of the old monuments when found necessary; and by virtue of said Act is fully empowered to represent and act for the Commonwealth of Pennsylvania, by the employment of such means as may be necessary in the premises, when from the reports of the county commissioners of said commonwealth or from other information satisfactory to him, it is found there is a necessity for the re-survey and re-location of said boundary lines, in whole or in part, or whenever any of the boundary line monuments are in such condition as to require resetting, replacing or renewing; and

Whereas, by virtue of the laws referred to in the two States named, the said State officers are required to co-operate with each other and act jointly in the examination and inspection, and, when found necessary, in resetting, replacing and renewing of monuments and in the re-establishing of the boundary lines between said States; and

Whereas, it appears from the examinations made in the years 1890 and 1893 that these monuments are displaced in whole or in part frequently by the action of frost, floods and by other causes, making their frequent examinations desirable to the end that they may be maintained in their proper position and condition; and it appearing that the welfare of the two States named will be conserved by examination and inspection of said boundary line monuments during the present year, and by virtue of the duties imposed upon the officers named by the respective States, as appears from the enactments in part recited; therefore

It is agreed, by and between the undersigned, acting in conformity with the authority conferred, as hereinbefore stated, that L. K. Devendorf, representing the State of New York, under appointment made by Edward A. Bond, State Engineer and Surveyor of the State of New York, and J. Hermon Terry, representing the State of Pennsylvania, under appointment made by James W. Latta, Secretary of Internal Affairs of the said State of Pennsylvania, shall be empowered, and by these presents, are hereby empowered, to cause to be repaired, reset and replaced any of the said boundary line monuments, which in their judgment may need to be so repaired, reset or replaced; and

It is further agreed that the parties herein named shall have full authority to represent the respective States in the discharge of the duties herein imposed, limiting the scope of their authority, however, to the examination of the boundary line monuments, between the two States, and to the replacing, and repairing of such monuments, as in their opinion should be replaced, reset or repaired, and to the furnishing and setting of the new monuments where the old ones are so far mutilated and destroyed as to render them unserviceable; it being understood that in case the examination and inspection to be made, shall disclose the

fact that there is a necessity for the re-surveying of any part of the said boundary line, for the purpose of determining its location, the engineers appointed as aforesaid shall have no authority to make such survey, until they shall have first reported the conditions to the parties hereto, which conditions, in their opinion, render such a re-survey a necessity, nor until written authority signed by both of the parties hereto shall be given them, authorizing such re-survey; and

It is further agreed, that the engineers herein referred to, and appointed under the authority mentioned, shall proceed at once to the discharge of the duties as set forth and shall diligently prosecute the work of examination and inspection and the discharge of the other duties to be done and performed, in order that the work shall be completed at as early a date as practicable; and

It is further agreed, that upon the completion of the work, provided for in this agreement, a full report shall be prepared of their operations, which report shall give in detail the location and condition of each monument and other interesting data pertaining thereto, as well as a statement of such action as may have been taken in regard to the same, such report to be made in duplicate, each to be signed by both engineers, one to be filed with the State Engineer and Surveyor of the State of New York, at Albany, and the other to be filed with the Secretary of Internal Affairs of the Commonwealth of Pennsylvania, at Harrisburg; and

It is further agreed, that the actual expenses incurred in the discharge of the duties herein referred to shall be borne equally by the two States in interest, except so far as may relate to the compensation of the two Engineers referred to, which compensation is to be arranged by each State separately, and that all expenses be accounted for, in verified statements, and, so far as practicable, supplemented by receipted vouchers from parties to whom disbursements have been made.

In witness whereof Edward A. Bond, State Engineer and Surveyor of the State of New York, and James W. Latta, Secretary of Internal Affairs of the Commonwealth of Pennsylvania, have hereunto set their hands and caused the seals of their respective departments to be hereunto affixed, this 11th day of June, 1900.

[L.S.]

EDWARD A. BOND,
State Engineer and Surveyor.

[L.S.]

JAMES W. LATTA,
Secretary of Internal Affairs.

Detailed Report of Field-Work, New York and Canada Boundary Line.

HON. EDWARD A. BOND, *State Engineer and Surveyor, Commissioner for the State of New York:*

WILLIAM F. KING, ESQ., *Chief Astronomer, Department of the Interior, Commissioner for Canada:*

SIRS.— When in October, 1901, we were directed by you to make an examination of the boundary line between the State of New York and Canada, we met at Rouse's Point on the 22d day of that month, and began our work at Monument No. 645, near the west bank of the Richelieu river, and followed the line westerly to the St. Lawrence river, which was reached on the eighth of November.

The monuments marking this section of the line were, with two exceptions, hollow cast iron pillars, six feet long, the lower half in the ground being six inches square, with projecting flanges at the bottom, the upper half above the ground tapering to four inches, the top closed in the form of a pyramid.

These monuments were set under the direction of commissioners appointed pursuant to the Treaty of Washington, concluded August 9th, 1842. The names of the commissioners, etc., in large projecting letters appear vertically on the sides of the monument as follows :

North side, J. B. ESTCOURT.

South side, ALBERT SMITH.

East side, TREATY OF WASHINGTON.

West side, BOUNDARY, AUG. 9TH, 1842.

In our examination of October, 1901, we found the location and the condition of these monuments briefly as follows:

No. 645 lay in about 2 feet of water, and 100 feet out from the westerly shore of the Richelieu river. This monument is much larger than those described above.

No. 646 is a large cut-stone monument, standing plumb, and is in excellent condition. There are inscriptions on the several sides, giving the names of the Commissioners, the Astronomer and his assistant, the countries divided, the latitude, $45^{\circ} 00' 42.8''$; longitude, $73^{\circ} 21' 27''$, and the date of the treaty.

No. 647 stood on the south side of an east and west road, 49 feet west of a north and south road, and about 66 feet west of the center line of the Grand Trunk railway; leaning 10 inches or 12 inches south, loose in the ground, and cracked down the southwest corner.

No. 648, on the east side of a highway running north and south, and on the south side of the westerly extremity of a road from the east; leaning north-westerly at an angle of 45 degrees, and cracked down the southeast corner.

No. 649 standing diagonally to line, about 8 feet south of a ditch, and 100 feet east of cedar, elm and maple second growth, on the south side of the line; in perfect condition, but leaning 8 inches or 10 inches south, and quite loose in the ground.

No. 650, about 25 feet west of the west side of a north and south road; entirely out of the ground; the original site was pointed out by parties living in that vicinity, and was indicated by a group of small field stone, about 9 feet east of an open shed.

No. 651, on the north side of a rail fence, leaning 6 inches south, and not firm; is in good condition; land is cultivated on both sides of the line; monument about 212 feet west of a fence running south and 294 feet west of a fence running north.

No. 652, in a rail fence in timber, and standing diagonally to line; condition perfect.

No. 653, in a north and south highway, about 7 feet west of the easterly limit thereof. There is a road on the Canada side of the line from this point west.

No. 654, about 15 feet west of east side of a north and south road and in line with a stone fence which forms the southerly boundary of a road from the east, terminating at this point; monument leaning northwest, but in good condition.

No. 655, in an opening in the center of a stone fence, leaning south, otherwise in good condition; on the westerly slope of high ground, and about 153 feet west of a stone fence running south.

No. 656, in dense swamp, about 500 feet west of the present easterly limit; diagonal to line; leaning 6 inches or 8 inches to the east, and in good condition.

No. 657, in a rail fence on a summit about 680 feet east of the highway; leaning 18 inches northeast, but in perfect condition.

No. 658, on the south bank of a ditch, and projecting about 2 feet 6 inches above the surface; the north and part of the east side to the depth of 17 inches below the top broken out; a creek crosses the line about 120 feet west of the monument.

No. 659, on the west side of a private road locally known as Lucas's road; about 4 feet west of the center line of a stone fence running south and about 5 feet north of the northerly end thereof; leaning a few inches east, but solid and in good condition.

No. 660, near the west side of a traveled road in line with a rail fence running west, and 57 feet 6 inches north of the northeast corner of a brick dwelling house owned by James Toner.

No. 661, on the west side of Upton's road, standing plumb, and in excellent condition.

No. 662, in south side of brush fence in mixed timber, principally cedar; monument leaning 8 inches or 10 inches south, but in perfect condition; about 10 feet south and 20 feet east of a large poplar.

No. 663, in hard wood timber, about 270 feet east of the southeast angle of cleared land on the Canada side; heaved about 4 inches, and not firm; leaning northerly 10 inches or 12 inches, otherwise in good condition.

No. 664, 10 feet east of a rail fence running north, and on the south edge of a rail fence running east and west; loose in the ground and heaved about 3 inches; small triangular piece broken out on the south side.

No. 665, on summit of a narrow ridge; a strip of clearing extends north from the line along the ridge. This monument was broken off close to the ground, the top standing on the cedar core; an old road runs north and south along the ridge.

No. 666, on a slight elevation opposite a small clearing to the south of the line; a second growth of timber continues on the north side of the line; clearing on the south side extends about 150 feet east and about 750 feet west of the post.

No. 667, on a pastured ridge running northeast and southwest; clearing to the north 200 feet wide; clearing on the south commences at this point and extends west; post in perfect condition.

No. 668, on the west side of a highway; heaved 18 inches; loose in the ground, otherwise in perfect condition. A small frame building used as a grocery store stands about 200 feet to the east and on the line; a stone building also occupied as a store and dwelling stands 45 feet or 50 feet to the west of the monument and on the line; names on sign, "ROSE, JODOIN & SON."

No. 669, in perfect condition; on the southeast angle of a clearing, and diagonal to the line; a rail fence runs north from this monument.

No. 670, in mixed timber, about 250 feet west of a creek, and 350 feet west of the beginning of the timber on the north side of the line; post heaved 15 inches, and very loose in the ground.

No. 671, on a ridge running north and south, and about 40 feet west of a fence running south; heaved 18 inches, and a piece broken out about 3 feet from the top.

No. 672, on small knoll in a rail fence, 19 feet east of a wire fence running north; leaning north, and cracked down the southeast corner.

No. 673, in center of a lane, heaved and almost down; condition, perfect.

No. 674, on the west side of Nichol's Road; was very loose, and had been heaved considerably; leaning at an angle of 45 degrees, but in perfect condition. Mr. Schreiber's house is on line about 68 feet east of the post.

No. 675, diagonal to line, and in perfect condition; about 25 feet west of the post a board fence runs south, and about 35 feet west a rail fence runs north into Canada.

No. 676, on the top of a bank about 75 feet west of a creek; diagonal to line; heaved 4 inches; loose in the ground, but plumb.

No. 677, on the top of a ridge; broken off below the surface; about 600 feet west of Mr. Richard's clearing.

No. 678, on the northeast slope of a rocky ridge about 10 feet west of a brush fence; diagonal to line; very loose, and heaved 10 inches; but plumb and in good condition.

No. 679, heaved 2 feet, very loose, leaning east; a square section broken out about 3 feet from the top; 150 feet west of the northeast angle of cleared land.

No. 680, at the north end of a rail fence, and due north of a small school house on the main road. This monument was used as a fence post, a wire fence leading east and west therefrom. Heaved 6 inches, loose in the ground, but plumb; badly cracked on the east side.

No. 681, on a high hill near a summit at the northeast angle of a pasture; leaning 6 inches east, heaved 6 inches, and cracked on the west side.

No. 682, on west side of a highway; loose; heaved about 20 inches; leaning 6 inches south; in good condition. Mr. Sheay's barns are on the line a short distance to the west.

No. 683, in thick timber at the top of a steep slope from the east; leaning slightly east and north; heaved 3 inches; solid in the ground, and in perfect condition.

No. 684, on high ground, plumb and firm; heaved 8 inches; a section 21 inches long broken out of the west side; also small hole near the top; a piece 10 inches

long broken out of the east side; about 150 feet east of an abandoned clearing; formerly occupied by Robert Story, now owned by Charles Barr.

No. 685, on the summit of a ridge, a few feet east of McDermott's east line; a wire fence to the east and north; post heaved 12 inches; and quite loose in the ground, turned sideways in the hole; badly cracked on east side near the top; had been used as a target; a good winter road passes about 100 feet to the south of the post.

No. 686, on the south slope of the bank of a creek; heaved about 10 inches, quite loose, and leaning 6 inches east and south. A piece 6 inches long was broken out one foot below the top; the north side cracked.

No. 687, on a ledge of rock north of and about opposite the center of the pond in the "Gulf;" about 20 feet below the summit level, and about 30 feet north of where the ledge breaks off almost vertically. The pond is 100 feet (approximately) below the level of the post, and in a deep gorge, which crosses the line diagonally northwest and southeast. The monument stood 5 feet above the surface with large pieces of rock around it; quite loose, but plumb, and in perfect condition.

No. 688, on top of what is called Huckleberry Rock on the southwest side of the "Gulf;" the site was marked by a flat-pointed stone on end, surrounded by a number of large flat stones similar to those placed around No. 687. A small piece of the monument was found in the hole.

No. 689, in a depression on high ground about 130 feet west of a cluster of three white birch trees; diagonal to the line; loose in the ground; leaning west 3 inches or 4 inches; heaved 8 inches or 10 inches; otherwise in perfect condition.

No. 690 had been heaved 18 inches; quite loose in the ground, leaning about 15 inches to the west; diagonal to the line; about 200 feet east of Mr. McDowell's Road, and 150 feet east of a small meadow to the south of the line.

No. 691, about 40 feet west of a winter road on Woodward Jackson's farm; heaved 18 inches; leaning 18 inches southwest, and quite loose in the ground; otherwise, in good condition; about 80 feet west of this point, a survey post, marked, XXXXI-XXXII stands about on line, and is intended for a lot line in Canada.

No. 692, on south edge of a good winter road along the line; broken off close to the ground; the top reversed, and standing in the base; the shell varied in thickness from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch.

No. 693, lying on the ground near a wire fence; its site was marked by a small circle of stones; there is a small clearing to the northeast of the post on the Canada side of the line.

No. 694, on a slight elevation, sloping north and west; diagonal to line; solid in the ground; leaning 3 inches east, and in perfect condition.

No. 695, in a thick second growth, about 20 feet north of a rail fence; pasture to the south of the line, extending to a rail fence 200 feet to the east; about 1,100 feet east of the Clinton Mills Road; monument leaning 4 inches east; heaved slightly, but in perfect condition.

No. 696, on high ground in thick hardwood bush, and about 8 feet south of a wire fence; firm in the ground though heaved 2 inches; leaning southwest about 5 inches.

No. 697, in stone bottom of fence running east and west and about 3 feet east of a wire fence running north; broken off near the ground, reversed and standing on bottom section; pasture to the south, and woods to the north.

No. 698, in a rail fence, leaning 3 inches north and 4 inches west, solid in the ground, and in perfect condition; cultivated land on both sides of the line; a wire fence runs north into Canada about 130 feet west of the post.

No. 699, on a high ridge opposite a fence running south, heaved 6 inches; leaning 6 inches south, but in good condition.

No. 700, on the top of the east bank of a stream; heaved 8 inches; leaning 10 inches south, and loose in the ground; diagonal to line; in perfect condition. There is a highway known as the Churubusco Road about 570 feet east of this monument.

No. 701, about 60 feet west of a wire fence running south; nearly opposite and about 40 feet south of a large ash tree; monument leaning west and south; loose in the ground; heaved 12 inches, but in perfect condition.

No. 702, leaning northeast about 5 inches; diagonal to the line; loose, and heaved about 4 inches; condition perfect. Pasture land to the north and south of the line, and a rail fence leading east.

No. 703, on east side of a road, projecting above ground 2 feet 4 inches; leaning north and west, but is firm; small pieces broken out near the top on the east and west sides. Monument stood 10 feet, 6 inches west of a frame store owned by O'Neil Brothers, and had been used as a hitching post.

Nos. 704 and 705, in field about 12 feet north of a wire fence; they were on the line, and about 8 feet apart; both heaved about 12 inches; 704 leaning 12 inches north and 6 inches west; No. 705 leaning about 8 inches or 10 inches west and north and slightly loose in the ground. The placing of two monuments close together indicates an astronomical station.

No. 706, about 120 feet east of a wire fence on the Canada side; leaning northwest under a tree top, and almost down; condition perfect.

No. 707, in a rail fence about 600 feet west of a highway, and about 90 feet east of a wire fence on the north side; bottom of the post in the ground under a pile of stones; top broken off.

No. 708, about 60 feet east of the northwest angle of a small pasture south of the line; leaning a little south and west; heaved about 6 inches; slightly loose, but in perfect condition.

No. 709, in rail fence 25 feet west of a wire fence running south and 60 feet east of poplar bush on the Canada side; post leaning north, very loose, and almost down, but in perfect condition.

No. 710, lying on the north side of a rail fence about 360 feet east of traveled road; some stones had been placed around the hole which was on the south side of the fence; the post in good condition.

No. 711, upon the east side of the highway; firm in the ground; heaved about 3 inches, leaning 15 inches or 18 inches west; a small hole on the east side near the top; band about 2½ inches wide just below the top; apparently used as a hitching post; in front of brick store owned by J. C. Cook.

No. 712, in a pile of stones on the south side of a rail fence about 60 feet east of a rail fence which runs north into Canada; leaning about 18 inches southwest; firm, and in perfect condition.



Condition in 1902 of cast-iron monument No. 683, showing break.



Condition in 1902 of cast-iron monument No. 706.
New York and Canada boundary line.

No. 713, about 75 feet west of stone fence running south; on the south side of a rail fence; heaved 6 inches; leaning north 8 inches; loose in the ground, with stones piled around the base; cleared land to the north and south of the line.

No. 714, on the east side of the Chateaugay road, 25 feet west of the remains of stone foundation of burned building; Richard Boyd's store stands on the west side of the highway, and is on the line; monument leaning 4 inches north, but solid in the ground, and in good condition.

No. 715, on high ground; heaved 3 inches; leaning 2 inches north, but solid in the ground, and in perfect condition.

No. 716, in low ground, 50 feet or 60 feet west of a low ridge; 15 feet south of a brush fence; heaved 3 inches, leaning 6 inches east, and in good condition.

No. 717, diagonal to the line; leaning 5 inches north; solid in the ground, and in good condition; in a wire fence running east and west, and about 80 feet east of a fence running north.

No. 718, on the north side of a wire fence about 200 feet west of the northeast angle of a clearing on the New York side; slightly heaved; leaning 3 inches west, and in perfect condition.

No. 719, on the east side of highway; leaning east 8 inches; heaved 4 inches, with triangular piece broken out of east side near the bottom; bullet hole in the west side; the remains of old stone buildings on line stand about 40 feet west of the monument; it is claimed by those residing in the vicinity that this post had been moved north.

No. 720, in the valley of the Chateaugay River; 10 feet west of the edge of the channel, diagonal to the line; slightly loose; leaning 4 inches north, and, with the exception of a bullet hole in the southwest side, in perfect condition.

No. 721, on the west side of the highway; leaning 8 inches east and north; badly cracked and a piece broken out of the east side; opposite and 5 feet east of the northeast angle of a frame store, owned by Mr. Bush.

No. 722, on the south side of a rail fence on the first knoll west of the highway; diagonal to the line; slightly loose in the ground; heaved 6 inches; leaning north and east about 4 inches; in perfect condition.

No. 723, in wire fence on a ridge in hardwood timber, about 360 feet west of a line in Canada, starting from a survey post marked XVIII on west side, XIX on the east side; monument diagonal to the line; heaved about 3 inches; plumb; two cracks down the southwest side near the top.

No. 724, on knoll, 1 foot south of a wire fence in hardwood second growth; heaved 4 inches; slightly loose in the ground, and leaning 3 inches north.

No. 725, about 60 feet west of a wire fence, running south 15 feet, south of a brush fence running west; diagonal to the line; heaved 6 inches; quite loose in the ground, but plumb, and in perfect condition.

No. 726, on dry ground, cleared to the north; small brush to the south; 2 feet south of a wire fence; heaved 6 inches; quite loose, leaning 6 inches south; about 123 feet west of a wire fence running south into New York State, and about 200 feet west of a wire fence running north on the west side of a small cultivated field in Canada.

No. 727, on low ground, 1,200 feet west of road and about 200 feet west of clearing on Canada side; in an open place in second growth, and stands 6 feet south of a wire fence; leaning north 4 inches and west 2 inches; heaved 6 inches; solid in the ground, and in perfect condition.

No. 728 on northerly slope of high ground in open hardwood timber; sharply defined, ridge starting 120 feet northwest and running northeasterly some distance; post diagonal to the line; heaved 7 inches; solid and plumb; piece 12 inches long out of the southwest side, and post badly cracked on the southwest and southeast sides.

No. 729, 55 feet west of a wire fence running north on the west side of a clearing in Canada, and about 55 feet east of Stebbins Creek; cultivated land on the south; post heaved 8 inches; quite loose, leaning 12 inches southwest; in good condition. Mr. Stebbins' barn is nearly opposite, and about 1,200 feet south of this monument.

No. 730, on a dry, stony ridge, about 325 feet west of a rail fence running north; pastured land on both sides of the line; post on the north side of a rail fence, in stone pile; firm in the ground, leaning 4 inches south, and in good condition.

No. 731, on south edge of a small pasture in Canada, on east edge of rocky knoll, about 40 feet east of a group of large bushy hemlocks; post broken off diagonally from 18 inches above down to near the surface of the ground; bottom section solid, but heaved 8 inches, and leaning northeast; irregularity in thickness of shell very noticeable.

Nos. 732 and 733 on line about 10 feet apart; on the south edge of cultivated land a short distance east of Trout River. Both monuments were leaning northwest and were almost down; a cluster of elms has grown up between the posts. The placing of these two monuments close together indicates, as already mentioned, an astronomical station.

No. 734 formerly stood on a peninsula in Trout River. The construction of a dam has raised the water so that during spring freshets the site is covered. It does not appear that this monument could usefully be replaced. No. 735 on Main street in Trout River village just outside of a two-plank board walk 14 feet 3 inches east of Mr. Dolan's Hotel; broken off close to the ground; base apparently in original position; line crosses Main street diagonally, a number of buildings being intersected.

No. 736, on the north side of a rail fence, a short distance west of the village of Trout River; diagonal to the line; heaved 18 inches; leaning northwest at an angle of 60 degrees, but is in good condition.

No. 737, on top of a stony knoll on the south side of a rail fence; pasture lands on both sides of the line; post 16 feet west of a rail fence running south; just north and west of the post there is a thicket of small cedars; monument diagonal to the line; solid in the ground, plumb, and in good condition.

No. 738, in pasture land 8 feet south of rail fence; at foot of a stony ridge running southwest; heaved 18 inches; very loose in the ground; leaning 2 feet southwest, but in perfect condition; some stones had been placed around the base; pasture land extends to the south; cultivated land to the north of the line.

No. 739 was found leaning northwest against a rail fence, bottom in a ditch; the core still in the ground; monument in perfect condition; the land adjacent to the line on both sides is level and cultivated.

No. 740, on the south side of a rail fence 210 feet west of a barn on the Canada side of the line; heaved 8 inches; loose in the ground; leaning 30 inches southwest, but in good condition; cleared land on both sides of the line.



Condition in 1902 of cast-iron monument No. 732
New York and Canada boundary line.

No. 741, on the south side of a rail fence, 25 feet west of summit of a rocky ridge; three large trees, a maple, a bass wood and a yellow birch, stand northeast of the post; monument diagonal to the line; cracked on the northeast side on the top; solid in the ground and plumb.

No. 742, on the northwest side of a road crossing the boundary diagonally, northeast and southwest; heaved 3 inches; plumb; and in good condition. Several buildings belonging to William Amlet stand on the line to the west of the post.

No. 743, in pastured land, about 10 feet north of the west end of a rail fence and the east end of a wire fence; about 6 feet west of a ditch running north; heaved 18 inches; leaning 4 inches south; very loose in the ground and cracked down one corner nearly two feet. This post had been turned one-quarter around to the east; it was also badly cracked near the bottom.

No. 744, 170 feet west of a creek, 60 feet west of the easterly limit of green timber on the Canada side; heaved 8 inches; leaning 2 feet west; very loose in the ground, but in good condition.

No. 745, at the westerly edge of a bad cedar swamp and at the easterly limit of a rocky ridge; heaved 6 inches; diagonal to the line; leaning 2 inches west; in good condition.

No. 746, heaved 4 inches; leaning south 6 inches; solid in the ground, and in good condition; on high, rocky ground on the north side of a rail fence, north of an abandoned road which ends about 60 feet east of the post.

No. 747, 18 inches north of a wire fence on a stony knoll, and in line with a rail fence running northeast; monument diagonal to the line; heaved slightly, but plumb and in good condition.

No. 748, on the east side of a highway in front of an old building used as a store; one foot south of the door, and eight feet out on the street; broken off close to the ground; bottom solid.

No. 749, on south edge of a knoll, the first high ground west of the road; heaved 6 inches; loose in the ground; leaning southwest 12 inches; and cracked on the southeast side.

No. 750, on the summit of a high, rocky knoll in the remains of a stone fence; diagonal to the line; heaved slightly; leaning three inches south; cracked down the southwest side from the top 18 inches; pasture to the north and south.

No. 751, in low, wet ground at the foot of a ridge, 320 feet, more or less, west of a fence running south; very loose; leaning north 12 inches; heaved 5 inches; small hole in the north side 2 feet from the top; on the north side of a rail fence; grove of maples on ridge to the west.

No. 752, on the east side of road leading north from Ft. Covington; leaning 5 inches east; solid in the ground, and in good condition.

No. 753, in wire fence in low, wet land; heaved 18 inches; very loose, plumb, and in good condition.

No. 754, near the center of the main street of Dundee; broken off close to the surface; buildings to the east and west on line.

No. 755, broken off 6 inches below the surface by ice; on northeast side of road along west bank of Salmon river; top now lying on the east side of the road.

No. 756, about 300 feet west of the east edge of Dundee swamp; on the south side of winter road, and about 65 feet west of a rail fence running south; diagonal to line; heaved 18 inches; leaning southeast about 3 feet; in perfect condition.

No. 757, in Dundee swamp, 15 feet south of the winter road; heaved 12 inches; leaning 36 inches west, but in good condition.

No. 758, near the southwest corner of clearing on Tyo's island; some stones around the base; very loose; leaning southwest 2 feet; heaved 1 foot; in perfect condition; diagonal to the line.

No. 759, 1,120 feet west of Pyke's creek; was found lying on the ground beside the fence; no evidence as to its position on line.

No. 760, on the northeast side of a road which comes up to the boundary from the south and extends west along the boundary for a short distance, and thence northwesterly into Canada; post at the west end of a stone wall from the east along line; leaning 36 inches northwest; solid in the ground, and in perfect condition.

No. 761, 2 feet north of a wire fence in low, swampy ground; cleared land to the north, but many stumps south of the line; about 200 feet west of an ash and elm swale, and is nearly north of Hollinbeck's house; heaved 15 inches; very loose in the ground, but in perfect condition.

No. 762, on high land between two swamps; 22 feet east of a wire fence running south; very loose; heaved 10 inches; leaning northwest 5 inches; diagonal to the line; cleared land to the north and south.

No. 763, in dense, wet alder swamp, 596 feet west of the easterly limit thereof; was very difficult to find.

No. 764, on easterly slope of hard wood ridge; leaning one inch south and one inch east; in good condition; about 500 feet west of the alder swamp.

No. 765, about 80 feet east of a water course; in a low, wet meadow; willow bushes along the line 200 feet to the west, but no indication of the line to the east for 500 or 600 feet, thence a wire fence; post heaved 12 inches; about 2 feet of the top broken off and missing.

No. 766, in a line of willow bushes; land cleared on both sides; leaning 8 inches east, but solid in the ground, and in good condition.

No. 767, land cleared on both sides of the line; no fence; line indicated by bushes; post about 800 feet south of a yellow house on the highway; leaning 18 inches northwest; solid in the ground and in good condition; cleared land extends about 600 feet along the line west of the post; thence thick second growth to the north and south.

No. 768, in southwest angle of a small clearing surrounded by brush; leaning 8 inches west and 6 inches north; solid in the ground; in perfect condition, and diagonal to the line; about 500 feet southwest of a small house in a pine grove.

No. 769, on summit of first ridge east of St. Regis river, in grove of small hickory and oak; heaved 2 inches; leaning 4 inches south, and in perfect condition.

No. 770, formerly on east bank of St. Regis river; has disappeared.

No. 771, on the main street of St. Regis, 6 feet southeast of a wire fence; leaning south and east 2 inches, slightly loose in the ground; heaved 3 inches; diagonal to the line; had been turned around 180 degrees. Running Deer's house on the east side of the street, and a small building on the west side, are on the line.

No. 772, on high ridge just outside and west of the Village of St. Regis; heaved 8 inches; leaning 6 inches east, and in perfect condition.

No. 773, on high ground about 4 feet northeast from old log stable; heaved 8 inches; solid in the ground; leaning west 3 inches and north 12 inches; condition perfect.

No. 774, formerly stood on the bank of the St. Lawrence River. The Indians say that this post has not been seen for many years.

In connection with the above description of the condition of the monuments at the time of our examination of 1901, it is of interest to refer to the results of the joint examination of this line, which was made in 1890. In the following table a comparison is made in case of a few monuments:

| No. | Condition in 1890. | Condition in 1901. |
|-----|--|---|
| 670 | Heaved 6 inches, loose, though plumb. | Heaved 15 inches, very loose. |
| 671 | Firm, but leaning slightly northeast. | Heaved 18 inches; piece broken out about 3 feet from top. |
| 679 | Heaved 1 foot, loose and leans south. | Heaved 2 feet, very loose. |
| 683 | Post plumb and firm. | Heaved 3 inches, leaning slightly east and north. |
| 685 | In hard ground, plumb and firm. | Heaved 12 inches, quite loose in ground, turned in hole; badly cracked on eastside. |
| 686 | Plumb and firm. | Heaved 10 inches, quite loose, leaning 6 inches east and south. Piece 6 inches long broken out of north side. |
| 699 | Plumb and firm, in hard ground. | Heaved 6 inches, leaning 6 inches south. |
| 700 | Plumb and firm in ground. | Heaved 8 inches, leaning 10 inches south, and loose in ground. |
| 756 | Leans a little southeast, but is firm. | Heaved 18 inches, leaning southeast about 3 feet. |
| 762 | Plumb and firm. | Very loose, heaved 10 inches and leaning 5 inches west. |

From this we may infer that in another decade, many of the posts which we found standing would be entirely out of the ground, and as many of the monuments indicated deflection angles, their re-location would be somewhat difficult. The monuments were not placed below the frost line, and the thickness of the shell was exceedingly irregular, varying from 5-16ths to 3-4ths of an inch. The action of the frost in the spring drew the post, and the irregular expansion and contraction during extreme temperature, cracked the shell.

Originally there were 130 monuments set on the section of the line between the Richelieu and St. Lawrence Rivers. Erosion of the easterly banks of the St. Regis and St. Lawrence Rivers has destroyed the sites of Nos. 770 and 774, and the construction of a dam on Trout River has inundated the site of No. 734, and these monuments have disappeared.

In summing up the above notes of our examination, we may give the following general statement:

| | |
|---|-------|
| In perfect condition (No. 646)..... | 1 |
| Heaved, leaning, loose or altogether out of the ground,
but in good condition..... | 83 |
| Solid, plumb and perfect..... | 9 |
| Cracked, broken or missing..... | 37 |
| | <hr/> |
| | 130 |

The above is sufficient demonstration of the necessity of renewing the monuments set in 1845. Ten only out of 130 were found in perfect condition.

The decision of the Commissioners under the Treaty of Washington as to the size and weight of monuments to be used, was, no doubt, largely influenced by lack of facilities for transport. Railways and excellent highways now cross and re-cross the line, and modern conditions prevail.

In reporting to you the results of our examination, we expressed the opinion that the size and weight of the existing monuments were insufficient. Apart from their want of permanency and the difficulty experienced in finding them, their diminutive appearance seemed altogether out of keeping with the importance of the line which they were intended to mark. The International Boundary between Canada and the United States should be marked more conspicuously and permanently than by small, cast-iron posts.

We observed that there were several railways and a number of highways crossing the line without any mark at the point of intersection. It was noticed that at several places along the line, high ridges occur between the posts. New monuments at road crossings (11 in all) appeared necessary, and also some five new monuments at intervening points.

In our report, we felt unable to advise any material expenditure, having for its object the perpetuation of the existing monuments; that is, the ninety-two which were in perfect condition. The cost of scraping, painting and resetting would, perhaps, be about twelve or fifteen dollars each. Although intact, the irregularity in the thickness of the metal would be a constant menace to their stability, and we could offer no satisfactory method of augmenting their strength. Concrete filling was considered, but the question of unequal expansion and contraction would still exist, perhaps to a greater extent, through the introduction of a core having a different and comparatively unknown, co-efficient of expansion.

Thirty-six of the existing monuments in any case would have to be replaced by new ones; apart from the additional sixteen at road crossings and intervening ridges.

The visible line, as located under the provisions of the Treaty of Washington, 1842, consisted of an opening in the forest thirty feet wide on the ground, with monuments at deflection and intermediate points. At isolated places the depression in the sky line of the timber is still plainly visible. But there are long sections of second growth where there is not the slightest indication of the position of the line. Where the land is cleared and cultivated, trees and brush have grown up along the fences, so that under present conditions it is almost impossible to see from any one monument to another.

We called your attention to the fact that in the case of the missing monuments, a re-survey of more or less extent would be necessary to replace them, and should you decide to build new monuments throughout, a rigorous instrumental survey of the whole line could be made at the same time at comparatively small additional expense. The plan and field notes of such survey would be of great value to both countries. They would effectually perpetuate the many governing points which indicate deflections along the line now established as the boundary between the Province of Quebec and the State of New York. The lengths of the tangents range from 20,700 to 2,300 feet, and the deflection angles from a few minutes to several degrees of arc.

You having decided to erect granite monuments along the whole extent of the line, and having awarded to a firm at Hardwick, Vermont, the contract for their construction and their delivery at certain convenient railway stations by the 1st of March, 1902, your representatives, previous to their delivery, met at Hardwick for the purpose of inspecting and accepting the monuments on your behalf.

In May, we were further directed to make preliminary arrangements for the field work of the renewal of all the monuments from the Richelieu to the St. Lawrence River, and of a rigorous instrumental survey.

We met at Three Rivers and made out statements of the number of men required, the tools necessary for the rebuilding of monuments, and the instruments to be furnished by each country for the purpose of carrying on the survey, and at once submitted them for your approval. We were then directed to commence the work as soon as possible.

On the evening of the third of June, the Commissioner for Canada and your representatives met at Rouse's Point. We at once began assembling material for the monuments, arranging for laborers, and in every way preparing for carrying out your instructions speedily and successfully.

It was supposed that the monument building would not progress as rapidly as the survey, consequently at the beginning, our energies were directed toward that branch of the work, and the first monument (No. 647) was built on the ninth of June.

Water to the depth of five or six feet covered the site of No. 645, which was left until later in the season. After several days experience, we found that the work could be carried on efficiently with the following staff:

| | |
|---------------------------------------|---|
| Foreman (expert concrete worker)..... | 1 |
| Teamsters..... | 2 |
| Stone breakers..... | 2 |
| Laborers..... | 3 |

The new monuments were located and constructed as follows: Where there was no doubt as to the old monument being in its true position it was first referenced by intersection hubs, east, west, north and south. These hubs projected twelve inches and were so placed that cords stretched between nails on their tops, passed exactly six inches east and north of the center of the old monument. The old monument was then removed, a hole three feet square (properly placed) was excavated to the depth of about four feet six inches.* Concrete mixture, one part Portland cement, two parts clean sharp sand, and five parts broken stone, properly rammed, was used to fill the excavation to within three inches of the surface of the ground. The cords were placed in position, and the monument adjusted thereto, and kept in place by guys attached to an iron collar which fitted over the pyramidal top. A form three feet square inside and twelve inches high was then carefully placed at right angles to the line and the concrete carried up to the top.

This portion of the base was finished with a mixture of one part cement and one part of sand, the top having an outward slope of about one in ten. While

*Where soft marshy ground was encountered, the hole was excavated to a sufficient depth to secure a solid foundation; where ledge rock occurred, all loose material was removed and the site washed and roughened, in order to secure a proper bond.

"setting" was in progress, brass plates with inscriptions of beveled projecting letters were placed in position on top and kept there until a perfect impression was obtained. Twenty-four hours after, the form was removed and the exposed surfaces given a fresh coat of Portland cement grout.

In addition to replacing the original monuments, sixteen new monuments were erected as follows:

No. 650 A. In a rail fence on top of a high ridge, between monuments 650 and 651. This point is visible for many miles from the east.

No. 651 A. On the easterly side of a highway, between Nos. 651 and 652.

No. 652 A. In pasture land, on a summit between monuments 652 and 653.

No. 657 A. On the westerly side of a highway leading north into Canada, and between Nos. 657 and 658.

No. 663 A. On the east side of a highway crossing the line, between monuments 663 and 664.

No. 665 A. On the right of way of the Grand Trunk Railway, and near the westerly limit thereof.

No. 674 A. On a high ridge, between Nos. 674 and 675. Cultivated land on both sides of line.

No. 676 A. On the easterly side of a highway, crossing the line between monuments 676 and 677.

No. 678 A. In cleared land, on high ground, between Nos. 678 and 679.

No. 679 A. On summit of a rocky ridge, in second growth timber, between monuments 679 and 680.

No. 695 A. On the west side of the north section of the Clinton Mills road, between Nos. 695 and 696.

No. 699 A. On the west side of the Churubusco road, about 570 feet east of No. 700.

No. 706 A. On the east side of McCann's road, between Nos. 706 and 707.

No. 722 A. On the west side of Jameson's road.

No. 727 A. On a sand knoll just east of the easterly limit of the right of way of the Mohawk and Malone branch of the New York Central Railway.

No. 751 A. On the westerly limit of the right of way of the Grand Trunk Railway.

All new monuments were placed on the line joining the two nearest original monuments.

Where deflection angles occurred, the original monuments were placed diagonally and in the original notes were called angular monuments. In accordance with your instructions, the new monuments were placed at right angles to the line.

Monument No. 734, previously referred to (see page 94), was not rebuilt. No. 754, which originally stood in the center of the main street of Dundee, was erected eleven and forty-eight hundredths feet west of the bottom of the old monument, which was left in place. No. 770, formerly on the east bank of St. Regis River was placed about ten feet east of the highway, which runs nearly parallel to the river, a short distance back from the east bank.

Monument No. 774, which formerly stood on the bank of the St. Lawrence River has been carried away by erosion. The new monument was erected about 100 feet east of the present bank.

In those cases where, as previously explained, two monuments had been set on line, to indicate an astronomical station, we did not consider it necessary to place more than one new granite monument.

Monument No. 645, in the Richelieu River, was rebuilt in October, at the close of our season's work. We measured easterly from No. 646, the distance given in the original notes; and found the stone foundation referred to in the report of the survey of 1845.

Owing to the fact that water covered the site to a depth of two feet, we constructed a cofferdam six feet square. A hole three feet square was excavated, nine feet below the surface of the water before we obtained a solid foundation.

The concrete was carried up to within six inches of the surface of the water before the monument was placed thereon. The base was constructed in the same manner as that of the other monuments, and when completed its top projected six inches above the surface of the water. The space between the base and the cofferdam was filled with gravel well rammed.

The other branch of the work — the survey — was conducted in the following manner:

This section of the boundary line, as located under the Treaty of Washington, consists of a series of tangents of different lengths, and of deflection angles irregular as to direction and magnitude. As the line passes through an inhabited country, and at many points buildings and orchards are on and along the line, it was imperative that we should place our survey lines near the boundary and have as few tangents as possible, in which we were fairly successful.

Thus we were compelled to adopt a system of survey which consisted of a succession of straight lines of different courses, and in order to secure the best possible results as regards azimuth especially, these lines were so placed as to obtain the maximum length without departing materially from the original line.

When organized, our survey party consisted of the following:

| | |
|-------------------------|---|
| Assistant surveyor..... | 1 |
| Chainmen..... | 4 |
| Axemen..... | 5 |

Office computations, based on the original notes, determined the position and direction of our tangents or transit lines. On the ground, these lines were run in accordance with modern precision methods. The position of each monument was referred rectangularly, to our transit line. Two independent measurements were made with narrow steel tapes. The leading chainmen used a tape sixty-six feet long and recorded the distance from monument to monument only; the check chainmen used a tape one hundred feet long, and continued their measuring throughout, noting the distance to each monument, and leaving marked stakes at hundred foot intervals. Temperatures were recorded, and every care exercised in carrying on this part of the work. Where differences between the two recorded distances were appreciable, new measurements were made.

The copy of the original notes which accompanied our instructions aided us materially in carrying on the work. As the survey progressed, it was found that the alignment of the original monuments between the diagonal monuments or deflection points was good, although errors were found in the deflection angles given in the notes.

It was a matter of current report that certain monuments, namely: Nos. 659, 719, 721 and 743, had been moved from their original positions by unauthorized persons. Our survey showed, however, that the first of these was only $4\frac{1}{2}$ inches from the true line, and No. 719 was exactly on line. Nos. 721 and 743 proved to be 3.99 feet and 4.41 feet, respectively, off line. No. 743 also was found to have been

moved easterly a distance of 53.81 feet, and, as will be seen from the notes we have given of our examination of the monuments, was completely loose in the hole and turned partly round. The discrepancies in the positions of these two monuments were much greater than any others found and far beyond the range of accidental error of line-running or monument-setting in the original survey; our survey shows the probable error of the placing of an original monument to be not more than two or three inches. This was considered by us to be corroborative of the rumored displacement, and we set the new monuments on the true line, No. 721, 3.39 feet, and No. 743, 4.41 feet south of where we found the old posts. No. 743 was also moved westerly 53.81 feet.

The astronomical observations, consisting of the determining of the azimuths of the transit lines, and of the latitude of certain points, were unavoidably delayed until the latter part of the season. Most unfavorable climatic conditions were encountered, and only about one-half of the necessary observations were secured. Azimuth station No. 5, near the Cherubusco road, marked the westerly termination of this work. The report in connection therewith will be made when observations are completed.

Field notes of our survey in duplicate will be elaborated during the winter season, and submitted for your approval.

We have the honor to be, Sirs, your obedient servants,

H. P. WILLIS,

Representing the Commissioner for State of New York.

C. A. BIGGER,

Representing the Commissioner for Canada.

IMPROVEMENT OF PUBLIC HIGHWAYS.

STATE OF NEW YORK.

CHAP. 115, LAWS OF 1898, as amended to March 1st, 1903.

AN ACT to provide for the improvement of the public highways.

Became a law March 24, 1898, with the approval of the Governor.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. The board of supervisors in any county of the State may, and upon presentation of a petition as provided in section two hereof, must pass a resolution that public interest demands the improvement of any public highway, or section thereof situate within such county, and described in such resolution, but such description shall not include any portion of a highway within the boundaries of any city or incorporated village, and within ten days after the passage of such a resolution shall transmit a certified copy thereof to the State Engineer and Surveyor.

§ 2. The owners of a majority of the lineal feet fronting on any such public highway or section thereof in any county of the State may present to the board of supervisors of such county a petition setting forth that the petitioners are such owners and that they desire that such highway or section thereof be improved under the provisions of this act.

§ 3. Such State Engineer upon receipt of such resolution shall investigate and determine whether the highway or section thereof sought to be improved is of sufficient public importance to come within the purposes of this act, taking into account the use, location and value of such highway or section thereof for the purposes of common traffic and travel, and after such investigation shall certify his approval or disapproval of such resolution. If he shall disapprove such resolution, he shall certify his reasons thereof to such board of supervisors.

§ 4. If he shall approve such resolution, such State Engineer shall cause the highway or section thereof therein described to be mapped both in outline and profile. He shall indicate how much of such highway or section thereof may be improved by deviation from the existing lines whenever it shall be deemed of advantage to obtain a shorter or more direct road without lessening its usefulness or wherever such deviation is of advantage by reason of lessened gradients. He shall also cause plans and specifications of such highways or section thereof to be thus improved to be made for telford, macadam or gravel roadway or other suitable construction, taking into consideration climate, soil and materials to be had in the vicinity thereof, and the extent and nature of the traffic likely to be upon such highway, specifying in his judgment the kind of road a wise economy demands. The improved or permanent

roadway of all highways so improved shall not be less than eight feet nor more than sixteen feet in width, unless for special reasons to be stated by such State Engineer it is required that it shall be of greater width. He shall, if requested by the resolution, include provision for steel plate or other flat rail construction in double track.

§ 5. Upon the completion of such maps, plans and specifications such State Engineer shall cause an estimate to be made of the cost of construction of the same and transmit the same to the board of supervisors from which such resolution proceeded, together with a certified copy of such maps, plans and specifications, and of his certificate of the approval of the highway or section thereof so designated as aforesaid.

§ 6. After the receipt thereof upon a majority vote of such board of supervisors, it may adopt a resolution that such highway or section thereof so approved shall be constructed under the provisions of this act, or of any existing act, and thereupon shall transmit a certified copy of such resolution to such State Engineer.

§ 7. In case the boundaries of such proposed highway shall deviate from the existing highway, the board of supervisors must make provision for securing the requisite right of way prior to the actual commencement of the work of improvement.

§ 8. Upon receipt of the certified copy of the resolution provided in section six, such State Engineer shall advertise for bids for two successive weeks in a newspaper published at the county seat of such county, and in such other newspaper as shall be deemed of advantage for the construction of such highway or section thereof, according to such plans and specifications, and award such contract to the lowest responsible bidder, except that he may in his discretion award the contract to the board of supervisors of the county or the town board or boards of the town or towns in which such highway lies, and except that no contract shall be awarded at a greater sum than the estimate provided in section five. But if no bid otherwise acceptable to be made within such estimate, such State Engineer may amend his estimate, certify the same to the board of supervisors, and upon the adoption by it of a resolution as provided in section six, based on such amended estimate, proceed anew to obtain bids and award the contract as herein provided. Such engineer may reject any or all bids and before entering into any contract for such construction he shall require a bond with sufficient sureties conditioned that if the proposal shall be accepted, the party thereto will perform the work upon the terms proposed and within the time prescribed and in accordance with the plans and specifications; and as a bond of indemnity against any direct or indirect damages that shall be suffered or claimed during the construction of such road; and until same is accepted. The people of the State of New York shall in no case be liable for any damages suffered. Partial payments may be provided for in the contract, and paid in the manner herein provided when certified to by such State Engineer to an amount not to exceed ninety per centum of the value of the work done; ten per centum of the contract price shall be retained until the entire work has been accepted. Whenever a county engineer has been appointed in the county in which

such highway or section thereof is to be constructed, he shall have general charge and supervision of the work under the direction of such state engineer, and shall report to him from time to time the progress of the work and such facts in relation thereto as may be required. If there is no county engineer, such State Engineer shall have some competent person to superintend and have engineering supervision of the work. (As amended by chap. 4, Laws of 1903.)

(§ 2.) This act shall not apply to any contracts now in force for the construction of roads under the provisions of this act entitled "An act to provide for the improvement of public highways," unless the contractor or contractors with the people of the State of New York for such construction work, shall file with the State Engineer a request for the application of said section eight as here amended to such contract or contracts, and a written acceptance of the surety or sureties upon the bond of such contractor or contractors, of such amendment to said section eight. (Of Chap. 4, Laws 1903.)

§ 9. One-half of the expense of the construction thereof shall be paid by the State Treasurer upon the warrant of the Comptroller, issued upon the requisition of such engineer, out of any specific appropriations made to carry out the provisions of this act. And one-half of the expense thereof shall be a county charge in the first instance, and the same shall be paid by the county treasurer of the county in which such highway or section thereof is, upon the requisition of such engineer, but the amount so paid shall be apportioned by the board of supervisors, so that if the same has been built upon a resolution of said board without petition, thirty-five per centum of the cost of construction shall be a general county charge; and fifteen per centum shall be a charge upon the town in which the improved highway or section thereof is located, and if the same has been built upon a resolution of said board after petition as provided in section two, thirty-five per centum shall be a general county charge and fifteen per centum shall be assessed upon and paid by the owners of the lands benefited in the proportion of the benefits accruing to said owners as determined by the town assessors in the next section hereof.

§ 10. The town assessors of any town in which any highway or section thereof has been improved or constructed pursuant to petition as provided in section two of this act, shall have power and it shall be their duty upon receiving notice from the board of supervisors of the county in which said town is located, of the cost of construction or improvement of such highway or section thereof in such town, to assess an amount equal to fifteen per centum of said total cost upon the lands fronting or abutting on such highway or section thereof. Such assessment shall be apportioned according to the benefits accruing to the owners of the lands so located, according to the best judgment of said assessors, upon at least ten days' notice of the time and place of such apportionment to the persons affected thereby, and after such persons have had an opportunity to be heard, and the assessments so made when duly attested by the oaths of such assessors shall be collected in the same manner as the general taxes of such town are collected. (As amended by Laws 1899, chap. 92.)

§ 11. The construction and improvement of highways and sections thereof, under the provisions of this act, shall be taken up and carried forward in the order in which they are finally designated, as determined by the date of the receipt in each case of the certified copy of the resolution provided in section six by such engineer as hereinbefore provided.

§ 12. Upon the completion of such highways, or sections thereof, so constructed by such engineer, and his acceptance of the same, and after payment has been made as herein provided, such engineer shall inform the board of supervisors of such county that the highways or sections thereof designated have been constructed as herein provided; and he may serve notice on said board to accept such highway thus constructed, which notice shall be filed in the office of the clerk of said county; and twenty days after the service and filing of said notice, such highway or sections thereof shall be deemed accepted by said board of supervisors of such county; and thereafter they shall maintain the same as a county road, and may apportion the expense thereof upon the town or towns which such board deems benefited thereby; and the commissioners of highways of the town or towns, respectively, wherein such improved highways lie shall care for and keep the same in repair, under the direction and supervision of the State Engineer and surveyor and such rules and regulations as he may prescribe. If any board of supervisors or any commissioner of highways shall fail or neglect to properly perform such duties within such time as may be prescribed by such engineer for the performance thereof such engineer may cause the same to be performed and the expense thereof to be paid by the State Treasurer out of any funds in his possession not otherwise appropriated, upon whom such engineer shall make draft therefor, and the amount thereof shall be charged by the Comptroller against the county in which such improved highway shall be located, and be included by the board of supervisors of such county in its next annual tax levy as a county charge, unless the same be apportioned as above provided, in which case it shall be included in the tax so levied upon the town or towns to which it shall be apportioned. (As amended by Law of 1902, chap. 53.)

§ 13. All persons owning property abutting on such road so improved, or residing thereon, shall thereafter pay all highway taxes assessed against them in money, in the manner now provided by law.

§ 14. Whenever any county has had aid in building any such highway, and it seems advantageous to such State Engineer that a section or sections of highway, not exceeding one mile in length, should be constructed under this act to connect these roads together, and would be of great public utility and general convenience, he may serve notice on the board of supervisors of such county, and shall file one in the county clerk's office, designating the highways already constructed and the existing termini, and the section or sections, in his opinion, necessary to be constructed and his reasons therefor. And it shall be the duty of the board of supervisors to provide for the construction of such connecting highways or sections thereof, within one year after the service and filing of such notice under this act.

§ 15. In addition to his other powers and duties, the State Engineer and Surveyor shall compile statistics relative to the public highways throughout the State and shall collect all information in regard thereto deemed expedient. He shall investigate and determine upon various methods of road construction adapted to different sections of the State, and as to the best methods of construction and maintenance of roads and bridges, and such other information relating thereto as he shall deem appropriate. He may be consulted at all reasonable times by county, city, town or village officers having care and authority over highways and bridges, and shall advise such officers relative to the construction, repair, alteration or maintenance of the same; and shall furnish such other information and advice as may be requested by persons interested in the construction and maintenance of public highways, and shall, at all times, lend his aid in promoting highway improvement throughout the State. He shall hold in each year at least one public meeting in each county, and shall cause due notice of such meeting to be given. He shall co-operate with all highway officers and shall assist county and town authorities, and when requested by them, furnish them with plans and directions for the improvement of the public highways and bridges.

§ 16. He shall report annually to the Legislature concerning all the work performed by him, together with such recommendations upon the subject of highway construction and maintenance as to him shall seem appropriate.

§ 17. The commissioners of highways and town board of any town, and the board of supervisors of any county, and all other officers who now have or may hereafter have by law the care and supervision of the public highways and bridges shall, from time to time, upon his written request, furnish him with all available information in connection with the building and maintenance of the public highways and bridges in their respective localities.

§ 18. The operation of this act shall not be affected by any special act, but the highways may be improved under this act or such special act wherever the same may now exist.

§ 19. No street surface railroad shall be constructed upon a portion of a highway, which portion has been or may be hereafter improved under the provisions of this act and the acts amendatory thereof and supplemental thereto, except upon the consent of, and under such conditions and regulations as may be prescribed by the State Engineer and Surveyor. (Added by Laws 1902, chap. 379.)

§ 20. This act shall take effect immediately.
(Renumbered § 20 by chap. 379, Laws 1902.)

THE "FULLER LAW."

"THE MONEY SYSTEM OF TAXATION" FOR HIGHWAY MAINTENANCE.

[Sections 49 to 53 of Highway Law, as amended to March 1st, 1903.

§ 49. *System of taxation defined.*—The system of taxation for working and repairing highways, as hereinbefore provided, shall be known as

"The Labor System of Taxation," and the system hereinafter provided, shall be known as "The Money System of Taxation."

(See Law 1895, chap. 717, as to filing contracts.)

§ 50. *Town may change its system.*—Any town may change its system of taxation for working and repairing its highways, by complying with the following provisions relating thereto.

(Revised from Law 1873, chap. 395, § 1.)

§ 51. *Vote thereon.*—Upon the written request of twenty-five taxpayers of any town, the electors thereof may, at a special or biennial town meeting vote by ballot upon the question of changing the system of taxation for working the highways; but no person residing in an incorporated village or city, exempted from the jurisdiction of commissioners of highways of the town, shall sign such request, or vote upon such question.

(Revised from Law 1873, chap. 395, § 2. Amended by Law 1895, chap. 386, and Law 1900, chap. 25 taking effect February 25, 1900.)

§ 52. *When change to take effect.*—When a town shall have voted to change the system of taxation for working and repairing the highways, as herein provided, such change, except in so far as it affects the duties of the town assessors in indicating and placing on the assessment roll the property and persons subject to assessment and taxation for the repair of highways and of the highway commissioners and town board in determining and certifying the amount of such tax, shall not take effect until the next annual meeting of the board of supervisors, after the town meeting at which it was decided to make the change; and until such annual meeting of the board of supervisors the former system of repairing highways and of taxation therefor shall remain in force in said town; provided, however, that when such change shall have been voted at a town meeting held subsequent to the first day of July in any year, it shall not take effect, except as to the duties required to be performed by the town officers specified herein, until the second annual meeting of the board of supervisors next succeeding such town meeting. In each town of Westchester county such change shall be for a term of not less than five years.

(Revised from Law 1873, chap. 395, § 10, as amended by Law 1888, chap. 240. Amended by Law 1895, chap. 386, and Law 1901, chap. 150.)

§ 53. *Annual tax under money system; certain villages exempt therefrom.*—Any town voting in favor of the money system, shall annually raise by tax, to be levied and collected the same as other town taxes, for the repair of highways, an annual sum of money, which shall be equal to at least one-half the value at the commutation rates, of the highway labor which should be assessable under the labor system; but in any town in which there may be an incorporated village, which forms a separate road district, and wherein the roads and streets are maintained at the expense of such village, all property within such village shall be exempt from the levy and collection of such tax for the repair of highways of such town; and the assessors of such town are hereby required to indicate on the assessment roll the property included

in such incorporated village, in a column separate from that containing a list of the property in the town not included in such village, and shall also place on the assessment roll the names of all persons liable to poll tax who are not residents of such village, and the board of supervisors are directed to levy a tax of one dollar on each person liable to poll tax as thus indicated; but this act shall not apply to assessments made for damages and charges for laying out or altering any road, or for erecting or repairing any bridge in such town. The amount of such tax shall be determined by the commissioners of highways and the town board who shall certify the same to the board of supervisors, the same as any other town charge. The clerk of the board of supervisors of each county containing a town which has voted for the money system shall, on or before the first day of January of each year, transmit to the State Comptroller a statement certified by him, and signed and verified by the chairman of such board, stating the name of each town so voting, and the amount of money tax levied therein for the repair of highways during the preceding year. The Comptroller shall draw his warrant upon the State Treasurer in favor of the treasurer of the county in which such town is situated, for an amount equal to fifty per centum of the amount so levied in each town. The county treasurer shall pay out the amount so paid to him on account of the money tax levied in any such town upon the order of the highway commissioner thereof, to be used by him, for the repair and permanent improvement of such highways therein, and in such manner as the commissioner of highways and town board may determine. The sum paid by the State to any town by virtue of this section shall not exceed, in any one year, one-tenth of one per centum of the taxable property of such town.

(Revised from Law 1873, chap. 395, §§3, 4, as amended by Law 1874, chap. 169, and by Law 1889, chap. 259. Amended by Law 1893, chap. 412; Law 1898, chap. 351, and by Law 1902, chap. 156.)

See Law 1871, chap. 171, providing for the assessment on real estate lying partly within village limits.

See Law 1895, chap. 717, providing that all highway commissioners of towns using the money system of taxation shall file their contracts with the town clerk.

WIDE TIRES.

Many tests have been made to establish the claims in favor of wide tires as against the narrow ones, and a few of the results are given as stated in Bulletin 12 of the United States Department of Agriculture by General Roy Stone. In Utah, at the experiment station, it was shown that a given load on 1½-inch tire pulled 40 per cent. heavier than when on a 3-inch tire, the test being made on grass sod. On a moist, but hard road, the percentage was 12.7 in favor of the 3-inch tire. In Ohio a wide tire test was made at the State University. An ordinary wagon with a new 3-inch tire was loaded with two long tons, or 4,480 pounds, and the draft measured by a dynamometer. On an ordinary earth road, in good condition and hard, the draft was 254 pounds. On a grass field it was 468 pounds. On a newly plowed field it was 771 pounds. As 150 pounds is the draft of an ordinary horse of 1,000 pounds, two horses could draw this load with ease on an ordinary road, and a ton and one-half on a grass sod, while with a narrow tire one-half as much, or a single ton, is a full load for a double team. Besides this the broad tires roll and level a road so that the more they are used the better the road becomes, while narrow tires cut it into ruts if it is at all soft.

Professor Sanborn, of the Missouri Agricultural College, tried the same experiment with wagons having tires of different widths, using a Baldwin dynamometer. The weight of the load drawn was 3,665 pounds each. The tires were 1½ inches and 3 inches respectively. The tests were made on blue grass sod partially moist. The draft of the wide tires averaged for level ground 310 pounds. For the narrow tires the draft was 439 pounds, or 41.6 per cent. more than the wide tire. Assuming the wagon to weigh 1,000 pounds, then on the broad tire 3,248 pounds would be drawn as easily as 2,000 pounds on the narrow tires. Again, the broad wheels in the trial did not injure the turf, while the narrow wheels cut through it.

The following report is made by the Vermont Highway Commission:

"If the present law was so amended as to limit the allowed weight per inch of tire to a definite number of pounds, we believe this would best accomplish the desired result. To determine what this limit should be, we have measured and weighed a large number of wagons representing a great variety of the heavier traffic in the State, and have concluded that the maximum weight, including wagon, allowed per inch of tire should be 550 pounds. This is higher than that placed by most authorities, but far less than the average on city pavements. The following table shows the load, including the weight of the wagon, that could be carried under such a regulation on varying sizes of tires."

| Width of
tire in
inches. | Allowed load, including
weight of wagon,
pounds. | Width of
tire in
inches. | Allowed load, including
weight of wagon,
pounds. |
|--------------------------------|--|--------------------------------|--|
| 2 | 4,400 | 3½ | 7,700 |
| 2¼ | 4,950 | 3¾ | 8,250 |
| 2½ | 5,500 | 4 | 8,800 |
| 2¾ | 6,050 | 4½ | 9,900 |
| 3 | 6,600 | 5 | 11,000 |
| 3½ | 7,150 | 6 | 13,200 |

For vehicles with suitable springs the allowed load could probably be increased one-third.

It will be seen, therefore, that the wide tires are not only lighter in their draft than narrow ones under nearly all conditions, but they cut up the road very little; in fact, when 6 inches wide they tend to make the road continually better.

That this subject has had the closest attention paid to it in Europe, is proven by the regulations adopted in the various countries, as reported by the United States consuls.

In Austria all wagons built for a load of more than 2½ tons must have wheels with rims at least 4½ inches wide (Styria and Carinthia), and if built for more than 4½ tons (in Styria) or more than 3½ tons (in Carinthia) the rims must be at least 6½ inches broad. In lower Austria a width of rim of 4½ inches is

required for loaded wagons drawn by two or three horses. In Bohemia the same regulation applies.

In France every freight and market wagon is a roadmaker. The tires are from 3 to 10 inches in width, usually from 4 to 6. With the few four-wheeled vehicles used the tires are rarely less than 6 inches in width, and the rear axle is about 14 inches longer than the fore axle, so that the rear or hind wheels run about one-inch outside of the level rolled by the front wheels.

In Germany the rule prescribes that all the wagons drawing heavy loads such as coal, brick, earth, stone, etc., must have tires at least 4 inches wide.

By carefully noting these regulations, one will see that in the European countries they have long ago discarded the narrow tires, much to the advantage of their roads and the saving of their horses and vehicles; and it is to be hoped that the American farmer, after digesting these statements, will see the advantage of such a self-evident proposition and follow their example.

The following quoted act gives to the supervisors of any county the power to enact local laws regarding the width of tires. Monroe county has enacted such a law, taking effect March 1, 1900.

CHAP. 155.

AN ACT to amend the county law relating to powers of boards of supervisors with reference to tires on vehicles.

Became a law March 28, 1899, with the approval of the Governor.

Passed, three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. Section seventy-nine of chapter six hundred and eighty-six of the laws of eighteen hundred and ninety-two, entitled "An act in relation to counties, constituting chapter eighteen of the general laws" as amended by chapter six hundred and forty-four of the laws of eighteen hundred and ninety-four, is hereby amended so as to read as follows:

§ 79. Powers as to tires on vehicles.—The board of supervisors may enact local and private laws regulating the width of tires used on vehicles built to carry a weight of fifteen hundred pounds or upwards, and may provide penalties for the violation thereof.

§ 2. This act shall take effect immediately.

The following are local laws which have been enacted since the passage of the above law:

WIDE TIRES ON VEHICLES.

LOCAL LAWS.

ONEIDA COUNTY.

Section 1. Width of tires on vehicles.—There shall not be used upon any highway in this county any vehicle built to carry a weight of twenty hundred pounds and upwards to twenty-five hundred pounds unless the wheels of said vehicle shall have thereon a tire of at least three inches in width, and the wheels of all vehicles built to carry a weight of upwards of twenty-five hundred pounds shall have thereon a tire of at least four inches in width.

§ 2. Penalty.—Whoever shall violate the provisions of this act shall be liable to a penalty of five dollars for each violation.

§ 3. When to take effect.—This act shall take effect January first, nineteen hundred and one.

Passed by the board of supervisors of the county of Monroe in annual session, 1899.

Number One.

AN ACT of the board of supervisors of Monroe county to regulate the width of tires used on vehicles on the highways in the county of Monroe, pursuant to chapter one hundred and fifty-five of the laws of eighteen hundred and ninety-nine, entitled "An act to amend the county laws relating to powers of boards of supervisors with reference to tires on vehicles."

Passed at the annual session of said board of supervisors, December 28, 1899, by a vote of twenty-nine for and nine against its passage.

The board of supervisors of Monroe county, pursuant to chapter 115 of the Laws of 1899, entitled "An act to amend the County Law relating to powers of boards of supervisors with reference to tires on vehicles," do enact as follows:

Section 1. No vehicle built to carry a weight of one thousand five hundred pounds or upwards shall hereafter be used, driven or propelled on or over any road heretofore or which hereafter may be improved under the provisions of the Higbie-Armstrong act, so-called, unless the same be equipped with tires of the width specified in section three hereof.

§ 2. On or after September first, nineteen hundred and one, no vehicle built to carry a weight of one thousand five hundred pounds or upwards shall be used, driven or propelled on or over any highway in the county of Monroe, unless the same be equipped with tires of the width specified in section three hereof.

§ 3. The tires used on such vehicles are hereby required to be the following widths: All wagons equipped with thimble skein axle of three inches or less in diameter, steel axles of one and five-eighths

inches or less in diameter, tubular axles of two and three-eighths inches in diameter, and built to carry a weight of one thousand five hundred pounds or upwards, shall have tires not less than three inches in width. All wagons equipped with thimble skein axles of three and one-quarter inches in diameter, steel axles of one and three-quarters inches in diameter, or tubular axles two and five-eighths inches in diameter, and built to carry a weight of one thousand five hundred pounds or upwards, shall have tires of not less than three and one-half inches in width.

All wagons equipped with thimble skein axles of three and one-half inches or more, in diameter, steel axles of one and seven-eighths inches or more in diameter, tubular axles of two and seven-eighths inches or more in diameter, and built to carry a weight of one thousand five hundred pounds or upwards shall have tires of not less than four inches in width.

§ 4. This act shall not apply to platform or three-spring wagons equipped with steel axles not to exceed one and one-quarter inches in diameter.

§ 5. Any person owning any vehicle which is hauled, propelled or used contrary to the provisions of this act, as well as any person engaged in hauling, propelling, using or having charge of any such vehicle, shall be deemed guilty of the offense herein prohibited. Provided, however, that any employee may prove in extenuation of the offense charged that the same was committed pursuant to instructions of his employer and in ignorance of the fact that such vehicle did not comply with the requirements of this act, but no such defense shall be admitted on the part of the employer or owner of the vehicle, under whose direction or with whose consent the same was used.

§ 6. Any person offending against the provisions of this act shall be deemed guilty of a misdemeanor, and shall be punishable by a fine of not less than five dollars nor more than twenty-five dollars, for each offense, and in case of failure to pay any fine imposed may be committed to jail not exceeding one day for each dollar of such fine.

§ 7. Courts of special sessions, having jurisdiction to try misdemeanors as provided by section fifty-six of the code of criminal procedure, shall have exclusive jurisdiction to try offenders in all cases occurring under this act in the same manner as in other cases where they now have jurisdiction and subject to the same power of removal and to render and enforce judgment to the extent herein provided.

§ 8. All fines collected under the provisions of this act shall be paid when the offense is committed in a town to the supervisor of that town for the highway fund to be paid out by him under the direction of the town board. When the offense is committed in the city of Rochester the fine shall be paid to the city treasurer to be used as the common council may direct.

§ 9. This act shall take effect March first, nineteen hundred.

The undersigned, Edward F. Wellington, chairman of the board of supervisors of the county of Monroe and Charles U. Bastable, clerk, of said board, do hereby certify that the foregoing local law was regularly passed and adopted by the board of supervisors of Monroe county

in annual session assembled, on the 28th day of December, 1899, by the vote recited in the preamble thereto.

In witness whereof said chairman and clerk have hereunto set their hands and affixed the seal of said county, this 6th day of January, in the year of our Lord one thousand nine hundred.

EDWARD F. WELLINGTON

Chairman.

CHARLES U. BASTABLE,

Clerk. .

ULSTER COUNTY.

AN ACT to protect streets and highways in the town of Shandaken, county of Ulster, New York, to regulate the width of tires on vehicles used thereon and to provide penalties for the violation thereof, pursuant to section ninety-seven of the county law.

The Board of Supervisors of Ulster County, do enact as follows:

Section 1. It shall be unlawful for any person or persons, corporations, or company to impair, injure or destroy any macadamized street or highway, or any street or highway constructed, built or top-dressed with broken stone in the town of Shandaken, Ulster county, New York.

§ 2. From and after the first day of April, nineteen hundred and one, the width of tires on all wagons or vehicles used upon the public highways of the town of Shandaken, Ulster county, shall be as follows:

1. Upon all vehicles built and designed to carry and carrying weight of fifteen hundred pounds and not exceeding two tons, exclusive of the weight of vehicle, the width of the tire shall be at least three inches.

2. Upon all vehicles built and designed to carry and carrying two tons or more exclusive of the weight of the vehicle, the width of the tire shall be at least four inches.

§ 3. Any person, persons, corporation or company offending against the provisions thereof, shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine of not exceeding twenty-five dollars or by imprisonment not exceeding twenty-five days, or by both such fine and imprisonment.

§ 4. This act shall take effect March thirty-first, nineteen hundred and one.

CITY ORDINANCE OF KINGSTON.

ULSTER COUNTY, N. Y.

AN ORDINANCE to protect the streets, avenues and highways of the city of Kingston, and regulate the width of tire on vehicles used thereon.

Passed December 7, 1900.

The Common Council of the City of Kingston do ordain as follows:

Section 1. It shall be unlawful for any person or persons, corporation or company, to impair, injure or destroy any macadamized, paved, asphalted or top dressed street, avenue or highway in said city.

§ 2. The width of tire on all wagons or other vehicles used upon any public highway within the city of Kingston shall be as follows:

1. Upon all vehicles designed to carry and carrying one ton or more, and less than two tons, exclusive of the weight of the vehicle, the width of the tire shall be at least three inches.

2. Upon all vehicles designed to carry and carrying two tons or more, exclusive of the weight of the vehicle, the width of the tire shall be at least four inches.

3. Upon all vehicles designed to carry and carrying five tons or more, exclusive of the weight of the vehicle, traveling on Washington avenue from North Front street to Linderman avenue, on Green street from North Front street to James street, on Crown street from North Front street to Green street, on Fair street from North Front street to Henry street, on Clinton avenue from North Front street to Henry street, on Henry street from Clinton avenue to Broadway, or on any other public highway in said city, now or hereafter paved with blocks or sheet asphalt, the width of the tire shall be at least six inches.

§ 3. It shall be unlawful for any person or persons, corporation or company, to take up or remove any asphalt or shale brick pavement in any of the public highways of said city without first obtaining a permit therefor from the superintendent of streets of said city, and then only under the supervision of the city engineer of said city, to whose satisfaction such pavement must be replaced and repaired by the person or persons, corporation or company taking up or removing the same.

§ 4. Any person, persons, corporation or company offending against the provisions hereof shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine not exceeding two hundred dollars, or by imprisonment not exceeding thirty days, or by both such fine and imprisonment.

§ 5. All ordinances and parts of ordinances inconsistent with the provisions of this ordinance are hereby repealed.

§ 6. This ordinance shall take effect immediately.

STATE OF NEW YORK, }
COUNTY OF ULSTER, } ss.:
City of Kingston. }

I, John T. Cummings, city clerk of the city of Kingston, do hereby certify that I have compared the foregoing ordinance with the original on file and on record in the city clerk's office, and that the same is a correct transcript therefrom and of the whole of said original.

JOHN T. CUMMINGS,
City Clerk.

VILLAGE ORDINANCE OF SAUGERTIES.

ULSTER COUNTY, N. Y.

AN ORDINANCE to protect the streets, avenues and highways of the village of Saugerties, and to regulate the width of tire, on wagons, carts and trucks used thereon.

The Board of Directors of the Village of Saugerties do ordain as follows:

Section. 1. From and after the first day of September, 1897, the width of the tire on all wagons, carts or trucks used upon any public street, avenue or highway within the corporate limits of the village of Saugerties shall be as follows:

1. Upon all wagons, carts or trucks, carrying a load of two thousand five hundred pounds and not more than six thousand pounds, exclusive of the weight of the wagon, cart or truck, box, rack, plank, or other construction upholding the load, the width of the tire shall not be less than three (3) inches.

2. Upon all wagons, carts or trucks, carrying a load of six thousand pounds or more, exclusive of the weight of the wagon, cart, or truck, box, rack, plank, or other construction upholding the load, the width of the tire shall not be less than four (4) inches.

§ 2. If any person traveling upon any street, avenue or highway, within the corporate limits of the village of Saugerties, with a wagon, cart or truck, upon which it is claimed by any director, street commissioner, or other person appointed by the board of directors, that the load upon said wagon, cart or truck, exceeds the weight authorized to be carried by section one of this ordinance, the person claiming the load to be in excess of the weight authorized to be carried on said wagon, cart or truck, shall at the time of making the aforesaid claim, inform the person in charge of the wagon, cart or truck, of the location of the scales upon which the wagon, cart or truck, with its load, shall be weighed, and after unloading shall again be weighed, and the difference between the two weights shall be presumptive evidence of the weight of the load. Such scale shall be designated by resolution of the board of directors, at which the aforesaid weighing shall be done, with the right, from time to time, to designate other scales. And if the person, persons, corporation, company, or the person in charge of said wagon, cart or truck, shall fail, or neglect to have the weighing done as hereinbefore provided, to ascertain the weight of the load, shall be presumptive evidence that the weight of the load is in excess of the weight authorized to be carried by the provisions of this ordinance.

§ 3. Any person, persons, corporation or company offending against the provisions hereof, shall forfeit and pay a penalty of fifty dollars (\$50.00) for each and every offense against the provisions of this ordinance, or against any one of the provisions hereof, to be recovered in an action with costs, by the "Directors of the village of Saugerties," for the use of said village.

§ 4. This ordinance shall take effect September first, eighteen hundred and ninety-seven.

I hereby certify that the above is a true and correct copy, and the whole thereof, of an ordinance passed by the directors of the village of Saugerties at a regular meeting held June fifth, eighteen hundred and ninety-seven.

(Signed.) C. H. VEDDER,
Village Clerk.

PROCEEDINGS OF THE THIRD ANNUAL GOOD ROADS CON-
VENTION OF THE BOARDS OF SUPERVISORS OF THE
STATE OF NEW YORK, HELD AT ALBANY, N. Y., JANUARY
28 AND 29, 1902.

TUESDAY, JANUARY 28, 1902 — MORNING SESSION.

Pursuant to the request of Edward A. Bond, State Engineer and Surveyor of New York, the delegates to the Third Annual Good Roads Convention of the Boards of Supervisors of the State of New York assembled at the city hall in Albany at 10.30 o'clock a. m., January 28, 1902.

The convention was called to order by Mr. Bond, who was unanimously chosen temporary chairman, and who addressed the convention as follows:

ADDRESS OF TEMPORARY CHAIRMAN.

DELEGATES TO THE CONVENTION AND GENTLEMEN: I thank the gentlemen for the honor that is conferred upon me. We have met here this morning at our third annual convention. I realize that I am addressing a convention of the boards of supervisors of the State of New York; that I am addressing as thorough and good a legislative body as can be found in any country. I say this without flattery, because I do think that if there is any one body of legislators that work carefully for the interests of their constituents, and for what they believe to be both economical and for the best interests of their county, it is the boards of supervisors through this State. I see in the faces of this audience an earnestness that I have not seen in our other meetings; I find that the subject of good roads in the State of New York is like snowballs started by boys on the hills — growing larger and larger. To-day we have money voted for half of the cost of roads of the different counties of the State of New York, upward of \$960,000, for which the State of New York has not yet voted its half of the money. We are here at the opening of

this convention to discuss all of the merits and demerits of the several laws in our State in regard to the improvement of highways. There is one subject that we all agree on, that is, that the highways in this State should be made better than they are to-day. The particular method or process for raising the money to make these roads better is yet a question for discussion — and is what we are here for.

It was suggested by some practical men that it would be wise for this convention to invite delegates from the highway commissioners of the State, and in sending out my request to the boards of supervisors this year to name delegates for this convention, I also asked that they name three highway commissioners from each of the counties. I am glad to see that they are well represented. We have a list of 40 counties represented here, covering the number of 110 supervisors and 50 highway commissioners. While all of these persons are not present just at this instant, before the close of the convention I believe they will be present.

I now await the pleasure of the convention.

On motion of Mr. Fitch, of Orleans, the chairman appointed a committee of fifteen on permanent organization, as follows: Messrs. G. W. Fitch, of Orleans; Edward J. Bedell, Albany; Frank D. Lyon, Broome; J. A. Chahoon, Clinton; John Carrier, Franklin; James A. Menzies, Erie; Adam Bickelhaupt, Jefferson; Milton Carter, Lewis; C. G. Schoen, Monroe; James R. Ottman, Oswego; Ira P. Cribb, Ontario; E. E. Dorne, Oneida; James Maloney, Onondaga; E. H. Merritt, St. Lawrence; Olin T. Nye, Schuyler; John L. Mandeville, Tompkins; Chauncey T. Secor, Westchester.

On motion, it was decided to hear the report of the standing committee during the recess of the committee on permanent organization.

At 10.28 the committee on permanent organization withdrew for consultation.

REPORT AND RECOMMENDATIONS OF THE STANDING COMMITTEE.

W. PIERREPONT WHITE, of Oneida County: Gentlemen, your

standing committee, appointed at the convention last year, met in Albany about two weeks ago, and after considering the line of work which had already been set out by your convention, we prepared a report for your further consideration, and for the purpose of bringing it more closely to your attention we went to the expense of having a little pamphlet printed, which contains not only our report, but a table copied from a publication issued by State Engineer Bond, and tables showing the condition of the highways under the Higbie-Armstrong act and under the Fuller bill, and also the number of days' labor under the labor system in the State, as shown by Governor Flower's report in his annual message to the Legislature in 1893.

The report of the standing committee follows:

REPORT OF STANDING COMMITTEE.

To the members of the Supervisors' Highway Convention, held in the city of Albany, January 28 and 29, 1902:

Your committee of two delegates from each judicial district, appointed by you February 15, 1901, would make the following report to you for your action:

HIGBIE-ARMSTRONG ACT, BEING CHAPTER 115 OF THE LAWS OF 1898.

We find that 41 counties in the State have taken advantage of this act. The only counties which have not up to January 1, 1902, asked for its benefit are Allegany, Cattaraugus, Chautauqua, Franklin, Genesee, Hamilton, Kings, Lewis, Niagara, Queens, Richmond, Schoharie, Schuyler, Seneca, Steuben, Tioga, Wayne, Wyoming, and Yates, and we feel certain that these counties will take advantage of the act as soon as their attention is called to the benefits that the other counties are receiving.

RESULTS ACCOMPLISHED IN FOUR YEARS.

In the four years since the Higbie-Armstrong law was passed the following is a summary of the results:

| | Miles. |
|--|--------|
| Roads finished..... | 59 |
| Roads in process of construction..... | 109 |
| Roads awaiting construction, 20 counties having raised and ready for immediate use \$960,000, their half of the money..... | 238 |
| Roads mapped by engineer's department..... | 546 |
| Roads surveyed by engineer's department..... | 704 |
| Roads petitioned for by 41 counties, including roads finished and in process, 1,308 | |

We call your attention to the great difference between the roads completed and the roads petitioned for during the past four years. There are 20 counties which have petitioned for 238 miles of road to be built in 1902, and have raised money in their counties amounting to \$960,000 ready for immediate use, and now await the State's appropriation of its equal amount of road money. The State engineer informs us that he has sufficient trained engineers in road building to properly and economically expend \$2,000,000 during the coming year in the building of the 238 miles petitioned for by these 20 counties. We would, therefore, recommend that you pass a resolution asking the State of New York to appropriate \$1,000,000 for the construction of main highways in the State of New York during the ensuing year, as provided by the Higbie-Armstrong act.

MAINTENANCE.

The question of maintaining the roads already built in order to get the greatest wear and economy out of the road material with the least expense to the communities where the roads are built is receiving close attention on the part of the people along the 59 miles of highways now finished.

The experience of the State of Massachusetts is so valuable on the question of maintenance that we quote from page 22 of the report of the Massachusetts Highway Commission for the year 1901, as follows:

"Repairs of stone roads should begin the day they are opened to traffic, and the attention they receive the first few months of use determines their usefulness and length of life. Long experience has clearly proved that better results are obtained and at less cost by maintaining the roadway in good condition at all times, by a system of continuous small repairs, rather than by leaving it until it is practically worn out and then thoroughly repairing. The commission has adopted the system of continuous repairs on all State highways. The cost of maintenance is about equally distributed over the roadway and roadside.

One of the chief sources of trouble in the roadway is ravelling, and the consequent loose fragments of stone scattered over the surface. On lightly-traveled ways this ravelling is more likely to occur than on roads with heavy traffic. Various expedients have been tried to prevent it. The only remedy which gives any degree of satisfaction is to sprinkle sand over the surface as often as needed. This coating of sand is a small fraction of an inch in thickness, and is spread over a width of about 8 feet in the center of the roadway. Some of the roads exposed to the wind require treatment several times during each year, while less exposed ones demand but little attention.

Heaps of broken stone are scattered alongside of most of the State roads, to be used, as occasion requires, in filling slight depressions or in cases of emergency.

Experiments convince the commission that a thorough rolling with a steam roller, in the spring, after the frost is out, but before the subgrade is dry, is one of the best means of keeping a stone road in good condition.

In building certain roads it was not deemed wise to import trap, to be used instead of a comparatively soft local stone. Two or three roads of this description have been broken up and resurfaced with trap, in order to reduce the cost of maintenance. In the roads referred to, the smaller fragments were ground up under the traffic, leaving the larger stones projecting through and making a rough surface.

The repairs on the roadside consist of cutting brush and weeds, cleaning waterways and gutters to permit the free flow of water, trimming down or cutting small waterways through shoulders, and filling washouts. On two of the State roads repairs are made by men employed for the purpose, who devote their entire time to it. One of these roads is 11 miles long, and passes through Yarmouth and Dennis and partly through Brewster. The other is in Huntington and Russell, and is 8 miles in length. These men furnish horses, wagons, and tools, and such material found within the location as is suitable for repairs. The State furnishes the broken stone or gravel teamed from off the location. The Yarmouth-Brewster road costs \$600 and the Huntington-Russell road \$480 per year. Under this system the best possible results are obtained and the roads are at all times in good condition. All other roads are cared for by local men working under the direction of a division engineer. As a rule, this last method is neither economical nor satisfactory, and it will be abandoned as rapidly as roads of sufficient length are completed to warrant it.

Dangerous defects are guarded by town officials and reported to the commission. Each State road is viewed by a division engineer at least once in two weeks and its condition noted, and necessary repairs are at once made.

In accordance with chapter 432 of the acts of 1900, the cost of repairs on State roads, not exceeding \$50 per mile, is to be paid by the towns and cities in which the roads are located."

SUPERVISORS' HIGHWAY CONVENTION: STANDING COMMITTEE. 123

We would recommend, therefore, in order to properly maintain the highways in New York State when they are once built, a resolution on your part calling for the necessary amendment to the Higbie-Armstrong act which will enable the State engineer's department, after the roads are completed, to take care of the repairs and divide the expense of maintenance between the State and the localities benefited.

BOND ISSUE.

It has been called to your committee's attention that if it has already taken four years' work to build 59 miles of road in the State and place 109 miles in course of construction, while 213 miles in 20 counties are compelled to wait the State's pleasure in appropriating an equal amount to match the \$960,000 already raised in those counties, that it will be something over a century before all the roads which are entitled under the Higbie-Armstrong act to receive State aid will come in for their portion under the present method of annual appropriation. Since the law was passed, four years ago, there have been petitions from 41 counties asking for the construction of 1,308 miles of highways. If the State builds 100 miles a year of highways it will take thirteen years to build the highways already petitioned for, and all other counties not now on the petition list must wait until the thirteen years have passed before any roads can be built in their counties under this act. This is not a desirable state of affairs and a solution must be found.

The solution of the difficulty has been suggested in a request to the State to issue State bonds at $2\frac{1}{2}$ per cent to 3 per cent interest, giving each county the benefit of the money raised from the bonds the same as they would be entitled to receive State aid under the annual appropriations in aid of the Higbie-Armstrong act—that is, if a county desired to build roads costing \$100,000 that the State should, in the first instance, pay the entire cost of the road from the money raised on the sale of the bonds. The State would then create a State tax to provide a sinking fund to retire its 50 per cent of the cost of construction and the interest on the money borrowed during the life of the bond. It would assess and levy in the county a tax each year of an amount equal to pay in a like manner the county's 35 per cent of the cost of construction, and the interest on its share of the money borrowed, and it would assess and have levied against the towns benefited a sum equal to their 15 per cent of the cost of construction and the interest on the money borrowed. In each case the assessment per annum would be sufficient only to create a fund to pay the interest and to retire a portion of the bonds each year during a long period of years. The counties and towns having the benefit of State credit would obtain their money at $2\frac{1}{2}$ to 3 per cent interest instead of 4 or 5 per cent, thus lessening the annual tax rate to them on the interest charge.

Your committee are not prepared to recommend any action on your part under such a proposition, but certainly believe that if the commercial interests of the State of New York are great enough to require the expenditure of \$60,000,000 in the deepening and widening of the Erie Canal to bring the western farmer into keener competition with the farmers of New York State, we most emphatically believe that the State of New York should at the same time expend an equal amount of money in the development of the highways of the State of New York to enable our own farmers to more evenly compete with the keener competition created by the enlargement of the canal.

WIDE TIRES.

Your committee would call your attention to the fact that it is worse than useless to create expensive and valuable highways to have them only cut to pieces by the use of narrow tires as now used for the hauling of heavy loads in this State. When you have got a good thing it costs money and you must take care of it and change your methods to help maintain it. Wide tires are of the greatest value in preserving ordinary dirt roads. We would, therefore, recommend the passage of a State wide-tire law, simple in its requirements, positive in its enforcements, and going into operation two years from this date in order to permit every wagon user to have ample time to adapt its tires to the new law in the interest of road maintenance.

SIGNPOSTS.

We would recommend to your attention the passage of a bill which will make the erection of signposts on the main highways and main market roads compulsory in each county, and the destruction of them a misdemeanor.

MONEY SYSTEM.

In the opinion of your committee, the greatest good can be accomplished for all the highways in the State in the shortest period of time by giving up the old method of working the highway tax by labor and asking our progressive farmers to pay their tax in money. Already under the Fuller law, being chapter 351 of the Laws of 1898, there are 25 counties, having 130 towns, which have adopted the money system, and will receive this next June \$90,000 State aid as an inducement to change from the labor system to the money system.

From all these 130 towns the report comes in that 50 cents on the dollar in cash under intelligent management does two, three and four times as much good to the roads as a day's labor used to do. There are some natural criticisms which the change has brought about that will need to be regulated by statute later on, but the total benefits to the roads are so marked that we would recommend the passage of a resolution asking that the entire State be placed upon the money system after January 1, 1903, and that all of the towns be entitled, for making the change, to the 25 per cent State aid as now paid to the towns under chapter 351 of the Laws of 1898.

In Governor Flower's message to the Legislature in 1893 he presented carefully prepared tables showing that the day's labor for the care of the highways in the State of New York in its 60 counties was approximately 2,000,000 days. Under the money system these 2,000,000 days would be commuted into a cash tax at 50 cents on the dollar, and the counties would raise for road work \$1,000,000 cash, and under the provisions of chapter 351 of the Laws of 1898 the State would be called upon to pay 25 per cent of the amount raised in each town back to the towns, which would amount to the State's paying annually \$250,000 to benefit the farmers' highways. In June, 1902, New York State will pay \$90,000 to these towns, and the increased burden to the State on the passage of such an act would amount to the sum of \$160,000. We most earnestly recommend this to your attention, as the change from the labor system to the money system would benefit every road in the entire State and bring to our farming communities better prices for their lands on account of the improved highways.

SUPERVISORS' HIGHWAY CONVENTION: STANDING COMMITTEE. 125

STATE PRISON LABOR.

Your committee would recommend the passage of a resolution asking the legislature to pass the necessary bills to compel the employment of prison labor in the State prisons in the crushing of stone for the building of State roads.

DELEGATES.

Your committee would recommend the passing of a resolution that at the next meeting in the interest of highways that each delegate hereafter appointed from the boards of supervisors bring with him to the convention as a delegate, with equal privileges with himself, either the highway commissioner of his own town or a highway commissioner from some other town.

STANDING COMMITTEE.

Your committee would recommend that you again appoint a permanent annual committee to represent the boards of supervisors of the State of New York on all matters pertaining to road legislation and the appropriation of money for carrying the same into effect by the appointment of two delegates from each of the eight judicial districts in the State; that these delegates appoint a chairman and executive committee, and that any three of the committee when present at a meeting may act, provided they are unanimous in their action or a majority of those present.

ASSEMBLYMEN AND SENATORS.

We would also recommend that each delegate here, while in Albany, call upon his senator and assemblymen, requesting an appropriation of \$1,000,000 for the Higbie-Armstrong road improvement under the State engineer's department, and also ask him to vote for a bill to make the money system compulsory throughout the State after January 1, 1903, and giving to each town 25 per cent of amount received for road work.

All of which is respectfully submitted.

PROGRESS OF ROAD IMPROVEMENT IN THE STATE OF NEW YORK.

In connection with the above report, the standing committee submitted tables, already alluded to by Mr. White, showing by counties the progress of road improvement in the State of New York, the totals to 1902 being as follows: Under the Higbie-Armstrong act — miles of roads petitioned for, 1,308; miles of roads surveyed, 704.5; miles of roads mapped, 546.9; miles of roads adopted, 407.4; miles of improved roads completed, 59.5; miles of roads in process of construction, 109.5; miles of roads adopted not under construction, 238.3. Under the money system (Fuller law) — State aid to counties for road improvement in 1898, \$34,517.73; in 1899, \$53,807.55; in 1900, \$67,655.84; in 1901 (estimated), \$90,460.16; State aid due counties, \$219,563; miles of roads approved by boards of supervisors, 231.4; amount appropriated by counties as their one-half of the estimated cost of roads approved, \$960,416.50; total estimated cost of roads as per plan approved by boards of supervisors, \$1,920,833.

FARMS AND VALUE OF FARM PRODUCTS OF NEW YORK STATE.

There was also submitted by the standing committee the following statement from the United States Census for 1890, showing for the State of New York the number of farms, value and tonnage of farm products, and canal tonnage:

Acreage and value of farms, with income from farm products and canal tonnage.

Acreage:

| | |
|--------------------------------|------------|
| Total number of farms..... | 226,223 |
| Acres in farms improved..... | 16,389,380 |
| Acres in farms unimproved..... | 5,572,182 |
| Total acreage in farms | 21,961,562 |

Values:

| | |
|---|---------------|
| Value of land, fences, and buildings..... | \$968,127,286 |
| Value of implements and machinery..... | 46,659,465 |
| Value of live stock, June 1, 1900..... | 124,523,865 |

Total valuation of farm properties.....\$1,139,310,616

Income, farm products:

Estimated value of farm products, 1889.....\$161,593,009

SUPERVISORS' HIGHWAY CONVENTION: STANDING COMMITTEE. 127

Canal tonnage:

| | |
|----------------------------------|-----------|
| Canal tonnage carried, 1900..... | 3,345,941 |
| Canal tonnage carried, 1901..... | 3,420,613 |
| Freight going east, 1901..... | 2,276,199 |
| Freight going west, 1901..... | 1,312,526 |

Tonnage, farm products:

| | |
|--------------------------------------|------------|
| Total annual tonnage, estimated..... | 12,000,000 |
|--------------------------------------|------------|

In agriculture New York State ranks third among the States of the Union, with an annual farm product worth \$178,000,000. She ranks first in the production of hay, annually raising, approximately, 4,000,000 tons of hay, which in tonnage alone exceeds the entire tonnage carried on the Erie Canal. New York is first in the production of potatoes, raising, approximately, 30,000,000 bushels per annum. First in the production of buckwheat, raising annually 3,000,000 bushels. In barley the State raises about 4,000,000 bushels; of corn, 17,000,000 bushels; of oats, 45,000,000 bushels; of wheat, 7,000,000 bushels; of rye, 3,000,000 bushels. Her products of cheese amounts to 126,000,000 pounds; her product of butter, 40,000,000 pounds; her product of wool, 5,000,000 pounds; her product of beet sugar, 8,000,000 pounds; tobacco, 6,500,000 pounds. One-sixth of all the fruit in the United States is grown in New York State, and three of her counties control the apple market of the world. Her butter product is equal to one-seventh of the entire product of the United States. Her cheese product is equal to one-third of the entire product of the United States.

[It is estimated that it costs on our present roads and with our present wagons twenty-five cents to carry a ton one mile.]

Mr. White addressed the convention at some length in explanation of the tables submitted by the committee, and in conclusion said: The question of road improvement in the State of New York is not a fad; it is a question of as great commercial importance as the question of cheapening transportation of the Erie Canal; it is a question of cheapening transportation from our farms to our commercial centers, where we dispose of our goods.

LETTERS INDORSING HIGHWAY IMPROVEMENT BY STATE AID.

Mr. BOND — While we are waiting for the committee on permanent organization we will hear from Mr. William Pierson Judson, my deputy, some papers and letters from different persons interested in the good-roads movement.

Mr. JUDSON — I have a letter from Col. William H. Moore, president of the National Good Roads Association, who organ-

ized largely the recent highway convention which was held at the Pan-American Exposition at Buffalo, and who we had hoped would be here to-day. He is engaged with others in conducting a "Good Roads train" over the southern part of the country, and he writes this very interesting letter:

LETTER OF PRESIDENT NATIONAL GOOD ROADS ASSOCIATION.

AUGUSTA, GA., *January 25, 1902.*

MY DEAR MR. BOND:—When I received your invitation to be present at the Supervisors' Third Annual Highway Convention at Albany I fully expected to be able to attend, and so advised you. I now find it will be impossible to reach your city in time. * * * Of one thing I am sure, and that is that you are on the right road in advocating and securing State aid to road construction. The examples of New York, New Jersey, and Massachusetts are arousing the deepest interest throughout the South, and in a few years many of the Southern States will adopt your plans. You will have some friction, no doubt, because some counties will not desire to be controlled by the State-aid plan, but will want to break away and build up plans of their own. These intimations were made to us while we were holding the International Goods Road Congress at Buffalo, September 16 to 21. I am fully convinced, however, that the closest band of union that can be promulgated, binding the State and the interests of the remotest counties in one general plan which will be systematic and economical in road construction, is the surest and most effective way of securing better roads.

Your engineering force at the capital, and placing an engineer in each county, must create system. In a very short time these plans will naturally educate the taxpayers as to the cheapest and best for ms of common-road improvement.

I find in visiting a large number of States each year that inefficient road officials are the chief cause of the wretched condition of the roads throughout the country. * * * In one great step, I find that New York and many other Northern States are behind some of the Southern States in the use of convict labor upon the public roads. North Carolina, with convicts, is building roads macadamized 6 to 8 inches deep, 15 to 20 feet wide, at a cost of \$1,100 to \$1,700 per mile. The same grade of roads, no better constructed, are costing from \$3,000 to \$5,000 per mile in Northern States. Write to Mr. P. H. Hanes, Winston-Salem, N. C., for detail facts along these lines. The citizens of many States, as well as many of their lawmakers, through false sympathy, and a lack of real knowledge as to the facts, have temporized too long with the convict problem. No able-bodied convict, tramp, or vagrant should be housed in prisons at public expense and brought in contact with the honest wage-earners of the nation. The labor of convicts and other able-bodied defective classes should be used to build roads, improve streets, sewerage, dredging streams, and upon other public works. Has your convention taken action upon this question?

I regret I cannot be with you. Wishing your meeting the success it deserves, and with great respect, I am,

Sincerely,

W. H. MOORE,

President National Good Roads Association, United States.

HON. EDWARD A. BOND,

State Engineer and Surveyor, Albany, N. Y.

The above was followed by a letter from Hon. James H. Macdonald, highway commissioner of the State of Connecticut.

Mr. JUDSON — The next letter is by ex-Senator Martin Dodge, who is Director of the Office of Public Road Inquiries of the U. S. Department of Agriculture at Washington, and who also is prevented from being here by the fact that he is conducting, through the Southern States, a "Good Roads train," which has been giving object lessons to the people of all parts of the country:

LETTER OF DIRECTOR OF OFFICE OF PUBLIC ROAD INQUIRIES, U. S. DEPARTMENT OF AGRICULTURE.

AUGUSTA, GA., January 25, 1902.

DEAR SIR:—I have your letter of January 18, requesting me to be present at the Supervisors' Highway Convention, January 28 and 29, and participate in your deliberations. I regret exceedingly that I shall not be able to comply with your request owing to other and previous engagements. But I am very glad to assure you, and through you the delegates to the convention, of my hearty sympathy with the great work in which you are engaged, and appreciate very highly the progress which you are making. It may be interesting for you to know that many people from many other States in the Union are looking to your example with a view of imitating it.

It has been my privilege to participate in an interstate convention of Georgia and South Carolina, just held in Augusta, Ga., and lasting two days, in which the road problem has been discussed from almost every point of view by many able and distinguished gentlemen, and I am sure you will be pleased to know the conclusions which they reached, as expressed in the resolutions which were unanimously adopted by the convention, and from which I quote as follows:

(1) *Resolved*, That this Good Roads Congress, now assembled, composed of delegates from the States of Georgia and South Carolina, is in our judgment one of the most progressive industrial steps ever inaugurated by the citizens of the two States, and we believe will ultimately result in improving the roads in all sections of Georgia and South Carolina.

(13) *Resolved*, That experience has demonstrated that the greatest progress for good roads has been made in the States where the system of State co-operation has prevailed under the direction and control of an engineering department; and that we recommend this plan to be adopted by our States as far as the same may be applicable to their conditions.

(15) That this congress indorses the use of convict labor where practicable in the work on public roads or in the preparation of materials therefor, thereby taking the convicts out of the competition with honest labor.

I notice everywhere I go a desire and tendency to abolish the old system of statute labor which has prevailed to such an extent heretofore, and to substitute in lieu thereof a money tax. I also notice that no real progress is made in the

substantial improvement of the highways unless they have one of three things—a general fund of money provided by the county; or an application of the prison labor to working the highways in a continuous and methodical manner, or State aid, as is so well exemplified in your own State.

It is encouraging to note in this connection that the Industrial Commission which has been sitting at Washington, D. C., for the past three years investigating the industrial condition that prevails throughout the country, has come to the conclusion, and has recommended in its report which is just submitted, that the various States should imitate the example of New Jersey and New York and give direct aid in the construction and maintenance of highways. The logic of events is leading to the conclusion that State aid or Government aid is essential to the success of this great and important cause, and there seems to be no good reason why the General Government itself should not be more liberal than heretofore in aiding the cause. I have lately received a communication from Hon. W. Rees Jeffreys, of London, England, in which he calls attention to the wasteful system of highway administration existing at the present time in England and Wales. It is interesting to note that a country so advanced in its system of highways should still be laboring under some of the difficulties of which we complain. I quote the following from an address by the Road Improvement Association, of London, on the reform of the existing system of highway administration, to the president of the local government board.

(3) Short of the old parochial and turnpike system which existed at the commencement of the nineteenth century, no more expensive system of road maintenance than that in operation in England and Wales to-day could be devised. The control of the highways of this country is divided between no less than 1,879 different authorities, whose limited jurisdictions and inadequate powers prevent the exercise of any effective control over the development of urban districts. The work that they perform could be carried out far more efficiently and far more cheaply by less than one-tenth of that number.

(4) That this would necessarily be the case is apparent when it is recalled that under the existing system each one of these 1,879 authorities is required to engage a surveyor and an independent staff to maintain a separate establishment for highway purposes, and to enter into separate contracts for the supply of material, etc. Moreover, the smallness of the area under the jurisdiction of each authority renders the carrying out of any considerable scheme of road construction an impossibility.

(5) In Lancashire alone, for example, there are no less than 151 highway authorities exercising jurisdiction over areas which have been mapped out in an arbitrary way without any regard as to what would constitute an efficient unit for the purposes of highway administration. There is no doubt that there would be a very considerable saving, as well as a great increase of efficiency, if one highway authority were constituted for all the important roads in the ancient or geographical county, i. e., including those in the county boroughs. The establishment expenses would be greatly reduced, material could be purchased more cheaply, and the highway authority would be able to secure the services of a small and highly skilled staff to direct roadmen of a class superior to those at present employed.

(6) As regards the management of the district or ordinary highways, a number of adjoining rural and urban districts could be grouped together so that the

financial resources of each district would be sufficient to enable them to pay the salary of a competent officer as surveyor and to purchase a steam roller. The district surveyors should, as in Scotland, be subject to the reasonable orders of the county surveyor. The joint committee of the county councils and the city borough should also have general powers of supervision over the maintenance of the district or ordinary highways, and should have power to determine and vary the direction of all new roads and streets.

A system devised on these lines would result in uniformity and economy of administration, and would give the large towns a more influential voice in the developments of the urban and rural districts surrounding them. It would also equalize the highway rate and, by causing the urban centers to contribute to the cost of the rural highways, would tend to relieve the pressure of the highway rate in rural districts.

Until highway authorities are created having jurisdiction over large areas, the roads in this country will continue to be maintained at a cost quite out of proportion to the results obtained. The arbitrary way in which a single road is divided for the purposes of maintenance can perhaps be best realized when it is pointed out that the main road from the city of London to Uxbridge (the old Oxford road) in the course of 20 miles, passes through the areas of no less than twelve highway authorities, and the main Bath road from Piccadilly Circus to Slough, passes in the first 20 miles of its course through the jurisdiction of no less than ten authorities. Each authority repairs its portion of the road, when it likes and with what material it chooses, without reference to the adjoining authority.

It is this arbitrary and unnecessary division of one road among so many authorities which is the prime cause of inefficiency and waste.

Whether, however, the number of local highway authorities is reduced or not, the need for a central highway department will remain. In fact, if the administrative difficulties in the way of a considerable reduction in the local authorities should prove insuperable, the more urgent will be the need for the immediate establishment of a central department.

If your legislature should appropriate the sum of \$961,000, as recommended by you for State aid in road building in New York, you would be able to give such a demonstration of the wisdom and success of this plan as has never been given in America. Your example would surely be imitated by most of the States in the Union in due course of time, for "a city set on a hill cannot be hid."

Thanking you for your kind invitation and earnest work, and wishing you continued success, I remain,

Very truly yours,

MARTIN DODGE,

Director of the Office of Public Road Inquiries,

U. S. Department of Agriculture, Washington, D. C.

HON. EDWARD A. BOND,

State Engineer, and Surveyor, Albany, N. Y.

WM. PIERSON JUDSON, of Oswego, Deputy State Engineer of New York — It is well known to members of this convention that our neighboring States of Massachusetts, Connecticut, and

New Jersey preceded New York State in the work of highway construction by State aid. Recognizing this fact, it has from the first been the policy of State Engineer Bond and of myself as the Deputy, to establish and maintain cordial personal relations with the officials of these States, and thus to receive from them full advantage of the experience which they have acquired at the expense of their several States. You will remember the valuable address made a year ago to this convention by Hon. William E. McClintock, chairman of the Massachusetts commission. In this way I am a member of the Massachusetts Highway Association, which is made up of the road builders of that State, from whose meetings I have obtained many valuable points regarding difficult features of road construction. Hon. Charles W. Ross, former highway commissioner of Massachusetts, is a member of this association, and is now the street commissioner of the city of Newton, which differs from any city in New York in that it is composed of some fifteen villages distributed over a large area and united by lines of the highest class of macadam roads, of which the city thus contains some 60 miles. As highway commissioner of Massachusetts, and as commissioner for the city of Newton, Mr. Ross has probably had as large an experience in the building of macadam roads as any man in the United States, and there can be no better practical lesson in this art than an examination of his work in actual use. He is unable to be present in person, but has prepared the paper entitled, "A few practical suggestions on road building," which this convention will be fortunate in hearing, and which will be published as a part of its proceedings:

A FEW PRACTICAL SUGGESTIONS ON ROAD BUILDING.

BY CHARLES W. ROSS.

Former State Highway Commissioner of Massachusetts and present Street Commissioner of Newton, Mass.

I will endeavor to tell you, in a few words, what has been accomplished in the way of road building in Massachusetts.

In the first place, we have a State highway commission, which was one of the first commissions of this kind established in the country, and this commission has

done an immense amount of good — building roads and giving advice to the cities and towns in all parts of the State. The representatives from any part of the State can feel perfectly free to go to the commission at any time and ask its advice in regard to work that is being done in the different localities.

We also have a highway association, which is composed largely of persons actively engaged in road building — mostly street commissioners and highway surveyors. At the present time there are about two hundred members, and we meet from time to time and discuss the subject of road building, and listen to papers which are read. (The constitution of this association is given at the end of this paper.)

The principal work of the association has been to try to create an interest in the different parts of the State as to the kinds of material to be used, the various machines which can be obtained to aid the work, and also to show how to get the best form of construction at the least possible cost; perhaps it is not the least cost in dollars and cents at the beginning, but what would seem to be the most permanent investment. The conditions in different sections of the State vary so largely that it is impossible to have a fixed rule, but individual cases should be studied.

The road-builders of the entire State are so much interested in this work that they are very anxious to consult with one another, and when a young man is appointed street commissioner who has had but little experience in that line, he is always welcome to come to our meetings and ask for such information as he desires from the older and more experienced members. This information cannot be obtained from books, and is merely practical experience. A man may have a technical education and yet be entirely disqualified to judge the proper kinds of material to be used in a first-class gravel or macadam road. This information can only be obtained from those who have had actual experience in this line and have profited by failings of their own as well as others.

The one great mistake is to change the superintendent of streets at each annual election. I have heard it said by men traveling through different sections of the State that they can invariably tell when they get into a town where the superintendent of streets is changed annually. If a man holds his position for a number of years he is sure to build better roads. It is a fact that a man who is elected for only one year cannot do his full duty. It does not seem that it should be so, but nevertheless the fact cannot be denied that a man who expects to be elected at the next annual meeting is obliged to submit to different tactics and take advice from those who are always so ready to give it, and in many cases know but little about constructing a road. If he tries to do his duty regardless of the advice given him by inexperienced people, he often fails to be re-elected. In a great many of the cities in our State it has been made a part of the city charter that the heads of departments should hold office during good behavior, or until such time as they prove to be disqualified for the position. This seems to be an incentive for a man to take the position and thoroughly educate himself to do the best work possible, the same as he would if employed by a corporation where he expects to be employed as long as he can show that he is giving an equivalent for every dollar intrusted to him. This is the only method by which good results can be obtained, and the sooner the people in this country get their minds down to the fact that a street commissioner should be held in office as long as he gives good results, the better it will be for the public in general.

I am convinced that in some places in Massachusetts money has been practically thrown away simply because the road builder lacked information as how to obtain the best results under the existing circumstances. I do not need to go into details, as anyone who is at all familiar with the management of municipal affairs can readily see how these mistakes have been brought about.

I believe that at the present time there is more demand for good, practical road builders than for men in any other line of business. A person who will try to put his mind to the work and obtain the best results for the one who employs him will certainly be sought for.

I am not sure that an association similar to our highway association would be necessary in New York, New Jersey, or several other States, as I know that under the direction of the State engineers and their able assistants not only the engineering but the practical side of the work is studied very carefully, and every effort is being made by them to hold public meetings and give the public the benefit of their experience; but in some States, where they depend so much on the local engineers, they have not, up to the present time, felt like holding public meetings and public discussions, which are so necessary in order to obtain the best results. The more the street commissioner and the engineer consult in regard to these matters the better the results, and I certainly think that an association which will combine both the engineering and practical experience is something that should be sought for.

In our State (Massachusetts) the Boston Society of Engineers is always ready to give information in regard to matters of drainage, cross sections, lines, grades, etc., and I think this has been brought about largely through the efforts of the highway association, combined with the friendly feeling existing between the two societies. When a local superintendent of streets feels that he can get along without the advice of the engineer, and sets himself up as authority, notwithstanding the technical knowledge which the engineer possesses, he makes a mistake not only for himself, but for the city which he serves.

The style of the road that is being built in different sections of Massachusetts at the present time is a very different type from that which was built ten or more years ago. For instance, in many places we find from practical experience that from 4 to 6 inches of macadam put on a good gravel foundation will give as good results as could possibly be obtained by putting on 8 or 10 inches, which was formerly the idea. It was evident that the large cost of building macadam roads could not be continued, and it was found by experience that something of a cheaper and yet a durable nature must be obtained. For instance, if a side street in a city has a good gravel foundation it can be covered with from 2 to 3 inches of crushed stone, put on in layers and thoroughly rolled, and give a good result. In many cases such a road is just as satisfactory as one covered with from 4 to 6 inches. When the amount annually appropriated by a city or town is small, it is a hard problem to solve — to know what to do to give the best results with the least amount of expenditure.

It has been thought by some that a good macadam road should last for all time, if properly built, but it does not seem possible that any character of road construction will last for a stated number of years, as the conditions are so variable. Here in New England we are submitted to such severe changes in the weather that what might apply to other States would not apply to ours. The heavy storms

which come so often do an immense amount of damage to our roads, and I can safely say that one heavy shower which we had last summer damaged the streets of the city of Newton to such an extent that it would have cost at least \$20,000 to put them in the condition that they were in before the storm. As these storms are so liable to occur, it has taught us to look for something more durable and something that will stand the severe storms of the spring and summer. There have been a great many experiments made in regard to a new mixture of concrete or bituminous macadam, and roads of this material are being built in many parts of the country at the present time.

My experience leads me to believe that in a short time many of our streets will be covered with a coating of bituminous macadam, which will insure them against the action of the weather, and they will not be affected either by freezing or thawing.

While the loss of fine material from the road after a shower is very great, there is also the additional expense of cleaning out the drains and catch basins that have been filled with this material, which is washed from the surface of the streets. It clogs the drains and goes from there into the small streams that lead to the river, and we are obliged to keep these cleaned at a great annual expense. If these roads could be surfaced with a less expensive material than asphalt, and yet give a smooth and lasting surface that would not be as slippery in the winter, or even in the summer when it is wet, and would ensure it against the action of the high winds that sweep so much of the fine material away during certain seasons of the year, it seems to me that the experience would be well worth trying. I hope before many years to see a great improvement in this direction.

CONSTITUTION OF THE MASSACHUSETTS HIGHWAY ASSOCIATION.

PREAMBLE.—The members of the Massachusetts Highway Association, in accordance with their charter, and for the more effectual execution of the design of their association, establish and ordain the following constitution and by-laws for the government of the said association:

ARTICLE 1 (*Name and objects*).—The name of the association shall be the Massachusetts Highway Association. The object of this association shall be the acquirement and dissemination of knowledge, both theoretical and practical, relating to the construction and maintenance of highways, by social intercourse and friendly interchange of knowledge between its members.

ARTICLE 2 (*Membership*).—The association shall consist of active, honorary, and associate members.

Persons professionally actively engaged in laying out or supervising the construction and maintenance of highway work shall be eligible as active members.

Honorary members shall consist of persons who have furthered the interest of this association, either by their acts or by their writings, and shall be deemed worthy of this association.

They shall have no vote on any subject in regard to the government of the association, neither shall they be subject to fees, dues, or assessments.

Other persons interested in the object of the association, and desirous of being connected with it, shall be eligible as associates.

They shall have all rights of members except the privilege of voting.

Admissions into or dismissal from the association shall be in accordance with such rules as shall be prescribed by the by-laws.

ARTICLE 3 (*Officers*).— The officers of this association shall consist of a president, two vice-presidents, a secretary, a treasurer, and four directors. They shall be elected by letter ballot at the annual meeting, and shall assume their duties at the close of said meeting, and shall hold office until their successors are duly chosen.

The president, secretary and treasurer shall be elected for one year; the vice-presidents for two years — one vice-president and two directors to be elected annually.

The officers shall constitute the board of government, which shall have the general management of the affairs of the association.

The election of officers shall be conducted as prescribed by the by-laws.

ARTICLE 4 (*Meetings, quorum*).— Meetings of the association shall be held at such times as may be prescribed by the by-laws.

The regular meeting in February shall be the annual meeting for the election of officers and for the hearing of the annual reports.

Ten members shall constitute a quorum for the transaction of business.

ARTICLE 5 (*Amendments, indorsements*).— Any amendment to this constitution may be made by a two-thirds vote of the members present and voting, cast in favor of such amendment in its final form, due notice of such amendment having been sent to each member with the notice of the meeting.

No proposition which includes the association's indorsement shall be passed, except as in the same manner as prescribed for amendments to the constitution.

PERMANENT ORGANIZATION.

At 11.20 o'clock the committee on permanent organization reported as follows:

Permanent Chairman.—William F. O'Niel, Franklin.

Secretary.—John J. Irving, Broome.

Vice-Presidents.—William C. Newell, Onondaga; James A. Woodard, Erie; Charles Chamberlain, Chemung; Avery A. Donalds, Orleans; A. Smith Hopkins, Westchester; C. W. Gledden, Orleans.

Committee on Business.—Frank Z. Wilcox, Onondaga; Thomas W. Scully, Erie; W. M. Warner, Ontario; D. B. King, Broome; John W. Thompson, Niagara; William B. Sears, Tompkins.

Committee on Resolutions.—Joseph B. See, Westchester; E. P. La Freviere, Onondaga; Thomas Williams, Jr., Herkimer; H. S. Ostrander, Orleans; Charles S. Farr, Seneca; Edward J. Bedell, Albany.

Committee on Legislation.—W. Pierrepont White, Oneida; Frank Z. Wilcox, Onondaga; Frank F. Herrick, Cayuga; Joseph H. Brownell, Broome; Fred Howland, Jefferson; George C. Diehl, Erie; Edward P. Kear, Westchester; De Witt C. Becker, Monroe.

Committee to wait on Governor.—Edward A. Bond, Joseph B. See, Westchester; W. Pierrepont White, Oneida; James A. Menzies, Erie; Frederick M. Power, Onondaga; G. W. Fitch, Orleans; C. H. Smith, Schuyler; Frank D. Lyon, Broome; Seth Mather, Jefferson; Charles R. Matthews, Franklin; Alphonso Collins, Monroe; Charles M. Thompson, Ontario; J. R. Ottman, Oswego; J. A. Chahoon, Clinton

ADDRESS OF THE PERMANENT CHAIRMAN.

WILLIAM F. O'NIEL, of Franklin, permanent chairman, addressed the convention as follows:

GENTLEMEN OF THE SUPERVISORS' CONVENTION—I thank you for the honor of presiding over your deliberations. I am somewhat rusty in matters of parliamentary procedure, and almost entirely unacquainted with the membership of this convention. These two things, no doubt, will detract to some extent from my chairmanship. I accept the position, however, relying on your kind forbearance and your co-operation to make the convention a success.

I have had no experience in the matter of construction of highways; I had no expectation of being in this place, and I shall, therefore, not assume to make an extended address. We are here to-day to contribute something—to do what we

can to advance the cause of highway improvement. While we may discuss the details of road construction, while we may talk about materials, we may touch somewhat the cost; we may talk about engineering features, we may talk about details of legislation; in my opinion these details will care for themselves during the future progress of the movement. The question before this convention, the question before the friends of highway improvement, is, How can we get good roads and how can we get them now? I, for one, during my lifetime, want to ride in this State over good roads in every town, every county, and every school district. It seems to me there are two primary essentials—two things to which the friends of good roads should direct their attention. The first is the building up of public sentiment. How can we get the people of the State to come in a mass to support this movement? Gentlemen, when the people of the State of New York, when the people of every city, every village, every hamlet, every country cross-road come to want good roads—come to really and earnestly and insistently want good roads, then good roads will come within our lifetime, within the next quarter of a century. It seems to me that is the foremost thing; that is, the first thing. Every friend of good roads should seek to devise some method, to formulate some plan; every member of this convention and every member of every good roads association and every friend of good roads everywhere should constitute himself a missionary to help support this work. One other thing, second in order, perhaps, but not less important: The chief characteristic of the times in which we live is the development and application of the principle of organization to the management of vast business enterprises; obliteration of the individual, or rather, the merging of the individual in a system, concentration, centralization—concentration of brains and money directed to a given purpose. What kind of a railroad would the New York Central be to-day if it were managed all through this State by the overseer of the highways of each town? We would be running on the iron straps that were laid on the wooden

rails of the first railway. We will never have a widespread, extensive, permanent improvement of the roads of this State until the present inefficient system (misnamed system) — rather a lack of system — is swept away, and in its place we have an organization, a central authority managing the highway system, both the construction and the maintenance, as New York State manages its educational system, as the United States Government manages the post-office, reaching down through this organization into every school district and every town.

Now, gentlemen, until we get these two things, until we get the people of this State in a mass behind this movement, until we have a systematic organization to carry it out, we never will have good roads. In my judgment these are the two primary essentials for success.

John J. Irving, of Broome, permanent secretary, said it was not customary for secretaries to make speeches, and he would not depart from the rule, but he would take the liberty, in thanking the convention for the honor conferred upon him, of concurring in the sentiments expressed by the chairman.

On motion of Frank D. Lyon, of Broome, Edward A. Bond, State Engineer of New York, and William Pierson Judson, Deputy State Engineer of New York, were made members of the convention, with all the privileges of the floor.

DELEGATES TO THE CONVENTION.

On motion of James A. Menzies, of Erie, the secretary called the roll of the convention, and following is a list of the delegates, the persons that upon motion were made delegates, and also the names handed the secretary during the convention:

REGULAR DELEGATES.

Albany County.—Peter Walker, Dunnsville; Dr. Edward J. Bedell, Selkirk; Ralph A. Gove, Loudonville; Ernest Williamson, West Township; John Flansbury, Voorheesville; Jared Haker, Coeymans.

Broome County.—David B. King, W. H. Slack, Castle Creek; Charles Van Amburgh, Port Crane; Frank D. Lyon, John J. Irving, Binghamton; Joseph H. Brownell, Windsor; Henry Collington, B. B. Badger, Onaquaga.

Cattaraugus County.—H. C. Holcomb, Portville.

Cayuga County.—Webb J. Greenfield, Moravia; William B. Reed, Sterling
nter; Frank F. Herrick, Owasco.

Chemung County.—Charles Chamberlain, C. D. Shapper, F. W. Meddaugh,
Elmira.

Chenango County.—W. B. Leach, Norwich; George L. Page, Greene; Isaac
Dalrymple, Otselic; Charles G. Brooks, Mount Upton.

Clinton County.—J. A. Chahoon, Ausable Forks; John B. Trombly, Altona;
Peter A. Fesett, Sciota.

Columbia County.—J. C. Rightmyer, Michael Arkison, Hudson; Lewis Furgew,
Gallatin.

Cortland County.—A. R. Rowe, McGraw; N. F. Webb, W. A. Smith, Cortland.

Dutchess County.—D. V. Moore, Clove Valley; R. W. Rives, New Hamburg;
C. J. Rockefeller, Madalin.

Erie County.—George Kelter, William H. Conboy, James A. Woodard, James
A. Menzies, Thomas W. Scully, George C. Diehl, Byron E. Gibson, Buffalo.

Franklin County.—William F. O'Neil, St. Regis Falls; John Carrier, Saranac
Lake; Charles R. Matthews, Bombay.

Fulton County.—P. M. Simmons, Johnstown; S. Elmore Burton, Gloversville;
John A. Chalmers, Perth.

Genesee County.—David Clark, Corfu.

Greene County.—M. O'Hara, Tannersville; H. R. Steele, Ashland; D. G. Greene,
Coxsackie; Elmer Krieger, Prattsville; Henry I. Van Loon, Athens; Harmon E.
Dibble, Platt Clove; Henry Brownell, Urlton; William Akins, Medway; George W.
Winnans, Kiskatom; Daniel Kirk, Spruceton.

Herkimer County.—L. B. Wheeler, West Winfield; Thomas Williams, Jr.,
Henry Wainman, Jordanville; John Fields, Middleville; H. H. Hull, Ilion; S. M.
Davis, Frankfort; Frank O'Roak, Millers Mills; H. D. Hiller, Salisbury Center;
J. R. Jones, Newport.

Jefferson County.—Fred Howland, Black River; Adam Bickelhaupt, Redwood;
Seth Mather, Lafargeville.

Lewis County.—Milton Carter, Harrisville; Charles T. Kilham, Copenhagen;
Charles H. Steinhilber, Beaver Falls; Charles E. Boshart, Lowville; Marcellus
Hartley, Martinsburg; Eli Sabin, Turin.

Monroe County.—Charles G. Schoen, Pittsford; De Witt C. Becker, Fairport;
Joseph Hubbard Caston, Penfield; E. F. Ellsworth, Alphonso Collins, Rochester;
H. E. Coy, Irondequoit; Hiram Shaw, Brighton.

Montgomery County.—R. S. Bulger, Hallsville; R. Schuyler, Fonda; J. Stewart,
Amsterdam.

Nassau County.—Smith Cox, Freeport; Edwin C. Willetts, Mineola; William H.
Jones, Woodbury; Edward A. Underhill, Glen Cove; Thomas T. Ramsdem,
Ocean Side; Samuel L. Hullett, Roslyn.

Niagara County.—A. C. Bigalow, Wilson; J. W. H. Kelly, Lewiston; John W.
Thompson, Ransonville.

Oneida County.—Frank E. Rowe, Bridgewater; Fred M. Wooley, Boonville; E. E. Dorne, Vernon; John F. Harvey, Utica; John D. Donnafield, South Trenton; Michael Gaffney, Clayville; William H. Kauth, Marcy.

Oswego County.—James R. Ottman, Myron Worden, Minetto.

Ontario County.—Ira P. Cribb, Canandaigua; W. M. Warner, Clifton Springs; Charles M. Thompson, Gorham; Edwin C. Hawkes, F. C. Douglass, Honeoye; Frank L. Parshall, Seneca Castle; Charles McIntyre, Geneva; John R. Van Arsdale, Manchester; Charles J. Smith, Naples; Edwin Cleary, East Bloomfield; Fred C. Tones, Bristol Center.

Orange County.—John I. Bradley, Wawanda; George Moshier, C. H. Wygant, Newburgh; Lewis F. Goodsell, Highland Falls; John Orr, Orrs Mills; William Wood, Middletown.

Otsego County.—Adriel G. Murphy, Middlefield; S. E. Armstrong, Unadilla Forks.

Onondaga County.—Frederick M. Power, Solvay; W. C. Newell, Lafayette; Frank Z. Wilcox, James Maloney, Edward P. La Freviere, Syracuse.

Orleans County.—Charles Gledde, Clarendon; A. A. Donalds, Medina; Henry Ostrander, Knowlesville; G. W. Fitch, Albion.

Putnam County.—Henry Mabie, Patterson; W. E. Perry, Cold Spring; Emerson Clark, Mahopac.

Rensselaer County.—Fred D. Nichols, Petersburg; Alvin T. Hoag, Tomhannock; D. A. Healy, Troy.

Sullivan County.—J. Davidson, Beaverkill; Charles Engelmann, Narrowsburg.

Saratoga County.—Everett Partridge, Edenburg; Spencer A. Sevatling, Middle Grove; George H. Whitney, Mechanicville.

Suffolk County.—Henry T. Brush, H. H. Denton, Huntington; James E. Gay, East Hampton; Daniel R. Davis, Coram; Capt. Frank Whitman, Islip; George H. Fleet, Cutchogue; James Thompson, Happaugua.

St. Lawrence County.—Edwin H. Merritt, Jr., Potsdam; Charles S. Plank, Waddington.

Seneca County.—Charles S. Farr, Lodi; Joseph S. Barnes, Waterloo; John B. Corkhill, Tyre.

Schenectady County.—Cyrus Scrafford, John Hugart, Thomas Killian, Charles Barhydt, Jacob Vine, Alanson Robinson, Le Roy Van Janot, Schenectady William T. Waddell, A. W. McMillan, Duaneburg; Garrett W. Freligh, Niskayuna; Walter Bradshaw, Rynexs Corners; D. H. Maynard, Scotia; Robert A. McAnley, Mount Pleasant.

Schuyler County.—C. H. Smith, Cayuta; Olin T. Nye, Watkins.

Tompkins County.—John L. Mandeville, Brookton; G. Rummer, Freeville; Albert Darrance, Newfield; John L. Hall, Danby; Clarence Buck, North Lansing; Horace D. Brown, Ithaca; Frank D. Fish, Enfield; William B. Sears, Groton.

Ulster County.—Henry McNamee, Fry Mountain; James McMillan, Brookhead; Simeon D. Van Wagoner, Rondout.

Westchester County.—A. Smith Hopkins, Armonk; Chauncey T. Secor, White Plains; Edward P. Kear, Yorktown Heights; Joseph B. See, Valhalla.

Washington County.—R. E. Warren, Hampton; John J. Morgan, Fort Edward; E. C. Whittemore, Granville.

DELEGATES MADE DURING THE CONVENTION.

Edward A. Bond, State Engineer and Surveyor; William Pierson Judson, of Oswego, N. Y., deputy State Engineer and Surveyor; Robert T. Taylor, Bolton, Clayton L. Pasco, Thurman, Lolan R. Dunlop, Stony Creek, Warren county, N. Y.; A. R. Shattuck, president Automobile Club of America; Joseph Oatman, alderman Twenty-seventh district, New York; William H. Thomas, vice-consul, Queens county, New York State Division, League American Wheelmen; Lucius H. Washburn, chairman highway improvement committee, New York State Division, League American Wheelmen; H. M. Valentine, Hollis, Long Island, delegate from Good Roads Association of Brooklyn and Long Island; W. Pierrepont White, Utica, N. Y.; George Wymans, Greene county, N. Y.; E. A. Clark, Onondaga county, N. Y.; L. C. Boardman, delegate from the Highway Alliance, New York city; A. C. Kniskern, George Lape, Mechanicville, N. Y.; Arthur H. Battey, of New York, editor Tri-Weekly Tribune; William S. Crandall, of New York, editor Municipal Journal and Engineer.

NAMES HANDED TO SECRETARY DURING CONVENTION.

G. O. Mead, Walton, N. Y.; Alfred Romer, Edward C. Rice, E. O. Sherwood, S. E. Du Puy, Auburn, N. Y.; John B. Uhle, president of the Highway Alliance, New York City; E. Lyman Brown, Poughkeepsie, N. Y.; Albert Dossance, Newfield, N. Y.; F. D. Fish, Enfield Center, N. Y.; William B. Sears, Groton, N. Y.; G. Rummer, Dryden, N. Y.; H. A. Brown, Ithaca, N. Y.; Clarence Buck, Lansing, N. Y.; G. W. Freligh, August John, Schenectady, N. Y.; F. B. Morss, assistant engineer eastern division, Albany, N. Y.; E. H. Alderman, Castle Creek, N. Y.; E. W. Van Slike, Lestershire, N. Y.; J. M. Holt, Jr., Port Dickinson, N. Y.; Ralph Russell, in charge Westchester County roads, Kenisco, N. Y.; S. B. Jamison, Marathon, N. Y.; G. K. Smith, E. A. Clark, Lafayette, N. Y.; H. D. Alexander, assistant engineer western division, Rochester, N. Y.; G. O. House, assistant engineer, western division, Lockport, N. Y.; John W. Weeks, Center Village, N. Y.; George W. Hobbs, Nineveh, N. Y.; Charles H. Flanigan, assistant engineer eastern division, in charge Orange County roads, Albany, N. Y.; N. E. Kelly and V. L. Tyrell, Harpersville; Smith Holcomb, Tunnel, N. Y.; S. S. Wilcox, Sanitaria Springs, N. Y.; James Sands, Vallina Springs, N. Y.; Otto Tolle, Albany, N. Y.; A. J. Rockwood, division engineer of western division of New York State, Rochester, N. Y.; S. D. Bush, Harrisburg, N. Y.; H. A. Van Alstyne, division engineer of eastern division of New York State, Albany, N. Y.; J. S. Nefsey, Bellwood, N. Y.; William B. Landreth, resident engineer of eastern division of New York State, Albany, N. Y.; Samuel T. Hurlbett, Roslyn, L. I.; Henry C. Allen, resident engineer of middle division of New York State, Syracuse, N. Y.; George O. Mead, Walton, N. Y.; M. W. Wilbur, resident engineer of western division of New York State, Rochester, N. Y.; F. W. Hartman, Downsville, N. Y.; George E. Gladstone, Margaretville, N. Y.; F. N. Sanders, assistant engineer, eastern division, in charge Ulster County roads, Albany, N. Y.; E. R. Dusenbury, Liberty, N. Y.; W. L. Thornton, Monticello, N. Y.; M. L. Dodge, Rockland, N. Y.; Hugh Hughes, Eli Sabin, Turin, N. Y.; L. K. Devendorf, middle division, Syracuse, N. Y. H. H. Reed, supervisor, Honeoye, N. Y.; F. G. Douglas, commissioner of highways, Honeoye, N. Y.; Edward Clary, commissioner of highways, East

Bloomfield, N. Y.; John C. Van Arsdale, Manchester, N. Y.; Edward Dailey, Babylon, N. Y.; Edward Bailey, Patchogue, N. Y.; Frank Parker, Islip, N. Y.; Dr. Skinner, Southold, N. Y.; E. H. Smith, Smithtown, N. Y.; W. L. Dickinson, Springfield, Mass.; Jonas H. Brooks, Berne, N. Y.; Silas Albertson, Mineola, N. Y.; G. Vanderpool, Selkirk, N. Y.; S. L. Depew, Auburn, N. Y.; Albert De Graff, eastern division, Fonda, N. Y.

W. PIERREPONT WHITE — I would like to make a suggestion. As I understand, when we convene this afternoon matters will be brought up for general discussion. I would like to ask the delegates, if no better plan is suggested or a more important matter, that we take up for discussion the first thing this afternoon the question of the adoption of the money system by a State act throughout the entire State. Some counties have done it; some towns have done it; but there are only about twenty-five that have. My idea is that there is nobody to be criticised for doing as their fathers and grandfathers have done. We have all done just what we have been taught to do. It is a question of progress. Will it be to our advantage, and is it to the advantage of the commerce of the State to change from the labor system to the money system by a general State act? I would suggest that the discussion this afternoon be in the form of a roll call, practically, of each town and each county for an expression of local opinion. Let us get at the people and see what they want. If the people, or a majority of them, want State aid under the Fuller act and apply it to the State in the line of progress, it will only take one little statute to benefit every mile of road in the entire State after 1903.

On motion of Mr. White, the question of the "money system" was made the special order for the afternoon session.

WILLIAM F. O'NIEL, chairman: This convention is organized on a voluntary basis. It was an inspiration on the part of Engineer Bond, who had been directed to go round the State; and he thought of this plan of calling you together. If there are associations of any sort who are interested in this question and who are here and who wish to co-operate with us, I would like to have them hand the names in so that they may become members of this convention. The rolls will be open.

On motion of Mr. Slack, of Broome, the convention adjourned until 2 p. m.

TUESDAY, JANUARY 28, 1902 — AFTERNOON SESSION

The convention was called to order at 2.25 p. m.

The chairman stated that the first business was the special order for the consideration of the "money system."

MONEY SYSTEM OF HIGHWAY TAX.

W. PIERREPONT WHITE.— Mr. Chairman, the question before the convention this afternoon is the discussion of the change from the "labor system" to the "money system." In taking up in the State of New York the discussion of how we can get at good roads quickest, there seems to be a general feeling through the many counties that if we could only have the money system our roads would commence to mend immediately, and that we would not have to wait such a long period for State aid, as is suggested in one of the Higbie-Armstrong bills. In other words, if some method can be gotten at by which the tax can be paid in money and expended under the highway commissioner our roads would commence to improve immediately. Twenty years ago Senator Coggeshall introduced a bill in the assembly (he was an assemblyman at that time) asking to have the law amended so that everybody would pay their road tax in money. Mr. Coggeshall immediately became the most unpopular man in the assembly. Now, in the twenty years since that bill was introduced by Senator Coggeshall, it has come about that there has been — four years ago — a statute put on the books known as the Fuller bill, by which it was made optional in each town, on the request of 25 taxpayers, to vote to change from the labor system to the money system, and if the people did not like it, on the request of another 25 taxpayers, or the same men, they could vote at any special or town meeting to change it back again. In other words, local control was granted by that statute as to how people could pay their tax. In the four years, from 13 towns that received State aid and voted to change, there are now 25 counties and 135 towns which have changed voluntarily from the labor system to the money system of working their roads. The result in

those 130 towns is that it is a good thing. Now, the question comes, if by this optional experiment these towns have found it to be a good thing, and as there is nothing wrong about it, is it not time for a highway convention to take up the discussion of whether the whole State, by a State act, should take advantage of the experience already acquired by these 135 towns? No town is to be blamed, and no county is to be blamed for working under the labor system. It is what we were taught and what we were brought up with, and what our fathers did — they didn't break away from it and have a money system until they had to. We wouldn't break away from it until gatherings like these discuss it.

My idea for discussion this afternoon is for each of the county representative delegates here to get up in turn and give their views as to whether it is desirable, and I present a formal resolution in order to discuss it:

Resolved, That this convention request their legislative committee to draft a bill and present it to some member of the assembly or senate, requesting the enactment of a law which will, after January 1, 1903, change the method of paying taxes from labor to cash at fifty cents on the dollar, and pay, from the State, 25 per cent of the amount raised back to the towns up to one-tenth of one per cent of the assessed valuation of those towns.

In other words, it is making a State law of what is now an optional law in each county.

In Oneida County four years ago one town adopted the money system. Later the three towns around it adopted the money system. The board of supervisors then recommended it for the other towns, and at the next election 13 towns adopted it, and now towns having a mileage of 1,000 miles have the money system. Four or five towns in Herkimer County have the money system. The southern counties adopted it, and owe much of their rapid change to the experience.

I believe in a discussion right here, as I have opened it on the lines which I think to be advantageous to everybody. If this convention think it best to suggest a change in the sentiment,

that change will do more for the roads in New York State in one year than any other thing we can do.

JOHN D. DONNAFIELD, of Oneida — I desire to offer the following resolutions. The committee appointed by the board of supervisors of Oneida county find that the law known as the Fuller law makes no provision for keeping the highways free from snow during the winter months. Under the labor system the highway commissioner appoints path masters, who have the power to order labor out to open the roads, which is an additional tax. The question is disturbing the minds of the inhabitants of the towns having adopted the money system, and causing a great deal of dissatisfaction and comment, and claiming that the law as it now exists is incomplete and inefficient to meet the demands of the traveling public:

Resolved, That this convention recommend that the sum of 5 per cent, or such portion thereof of the money raised for working and maintenance of the highways, be appropriated for that purpose. [Keeping the highways free from snow during the winter months.]

Resolved, That this convention recommend that the law be so amended as to afford this much needed relief.

Joseph B. See, of Westchester, rose to a point of order.

The CHAIRMAN — In the absence of any rule, and the general character of the convention, we cannot be held down as closely as other bodies. The chair declines to receive the resolutions and thinks that, if there is no objection, they ought to be referred to the committee on resolutions. The point of order is not well taken.

On motion of B. B. Badger, of Broome, the resolutions were referred to the committee on resolutions.

Frank Z. Wilcox, of Onondaga, moved that the roll of counties be called, and that each county be limited to five minutes in the discussion of the question, that there may be as general a discussion as possible.

The motion by Mr. Wilcox was adopted, and the secretary called the roll of counties, with the following expression of sentiment:

EXPRESSION OF SENTIMENT BY COUNTIES ON THE MONEY SYSTEM
FOR ROAD IMPROVEMENT.

Albany County — DR. EDWARD J. BEDELL — I represent the town of Bethlehem, which was the first to adopt the money system two years ago. There were so many that wanted the money system that we carried the town by 165 majority for the system. So far as we have been working under the money system, we who have an interest in good roads, realize that we are tending toward better roads. It is a step in the right direction. I am here to say that under the money system our roads have been kept open better than they were under the other system, and I believe it is the proper way to work. I believe we are on the right step toward good roads. I am in hopes of seeing at the next election all the towns in our county adopt the money system.

THE CHAIRMAN — In the law as it now stands, to change from the labor system to the money system, it is necessary to have a vote at town meetings. That is a pretty slow process, and it means a good many years. The recommendation of the committee that seek to change that feature of it is to get a law passed which will put the whole State upon the money system. In calling the roll to discuss the merits of the cash system as against the old labor system, I think particularly the desire is to obtain the opinion of this convention as to the desirability of making that change. So in this discussion the committee would like especially to know how the members feel about the passage of a State law putting the whole State on a cash basis at once.

RALPH A. GOVE — As I understand the bill, it is that where the assessment is to be paid it would be paid by 50 per cent. of the amount assessed. If that is the case, where the amount of labor amounted to \$8,000 the amount of tax would be \$4,000.

THE CHAIRMAN — As I understand it, this 50 per cent is the minimum; a town might raise more if it thought best.

E. A. BOND — That is correct.

Broome County — DAVID B. KING — In our county we have one town working under the money system. I think that a majority of the board of supervisors would be favorable to this proposed action on the part of the legislature.

JOSEPH H. BROWNELL — I am one of the gentlemen whose name is attached to the report before you, and I was not fooling in any way when I recommended that the money system be substituted for the labor system. I believe that it would promote the interest of good roads in the State of New York if the system was changed to the money system from the labor system. As far as I am personally concerned, I believe that I would represent a majority of the people in Broome county in this proposition, and I would be favorable to urging the members of the legislature to make that change.

Chemung County — CHARLES CHAMBERLAIN — I will say that I am in favor of the money system throughout the State.

Cayuga County — WEBB J. GREENFIELD — I think there are but two towns in our county that have taken a vote in regard to working under the money system. One of those has never commenced it. The other has adopted it, and obtained good results. I think, as far as my experience is concerned, that the money system would give a good deal better results than the labor system. I think we could have more results and better roads under the money system. I should recommend it.

Cattaraugus County — H. C. HOLCOMB — I am highly in favor of any proposition that would bring about better condition of our highways. I think at present, knowing our people as I do, I should favor the resolution, coming from the gentleman from Oneida, of commencing a little at a time, and adapting our people to it — paying, for instance, a percentage of the highway tax and working out the other part. Up in Cattaraugus they are just beginning to get stirred up to the necessity of doing something.

Chenango County — CHARLES G. BROOKS — I learn that we have ten towns in our county which have adopted the money system, and that it is giving entire satisfaction. I think I certainly

would be in favor of a change to the money system in my town, now working in the old-fashioned way. From what I have learned from meeting supervisors, there are many more who would be glad to make the change. I think it is certainly time that there is a change some way to get competent work. My experience has been such that I have been upon the road driving very much, and I have learned that farmers are not competent road builders. Each farmer will work his own district in his own way, but how many of them have different ways of doing it. I think it time we adopted a uniform way, and consequently the money system would be a great advantage.

Columbia County—J. C. RIGHTMYER—As far as Columbia County is concerned, I could not say for the whole county. We have one town in our county that is working under the money system, but I think the majority of them would be in favor of the money system. It benefits the roads. I am in favor of the money system.

Cortland County—N. F. WEBB—I will say that the situation in this county is practically this: One year ago last fall one of the towns in the county changed from the labor to the money system, raised the money at that time, and last summer worked the roads under the money system; the supervisor from that town reported that all were well pleased with the change. Last February at the town meeting seven more of the towns of the county voted to make the proposed change, so that now in Cortland County there are eight towns out of the fifteen under the money system. The other seven towns have had no experience, but will put the system in practice next summer, having raised the money this last tax. In regard to making the change compulsory, or making it a State law, I could not answer for the whole county, but judging from the position that the board of supervisors have taken, I should say that the plan would meet with approval in the county.

Dutchess County—R. W. RIVES—In regard to Dutchess County, I think I can safely say that the majority of the board of supervisors is heartily in favor of the money system, inas-

much as fourteen of the twenty-one towns work their roads on the money system, two of which adopted the system last election. I think the majority in this case shows a decided sentiment in favor of working roads by the money system, and would be, therefore, in favor of any legislation that would guarantee such a result.

Erie County — JAMES A. WOODARD — I think that Erie County is progressive enough, and that when the entire State is working the money system satisfactorily the people would adopt it, but I do not think they would go on record as adopting it.

WILLIAM H. CONBOY — There are but two towns in Erie County that have adopted the money system. One is Grand Island, which I have the honor to represent. We have been on the cash system for two years and are thoroughly satisfied with it, and would not go back to the other system for any consideration. I do not know what the resolution is that is up for discussion before the convention, but I do say I am in favor of the passage of legislation making it mandatory upon the towns to adopt the cash system. The way I would suggest to get at that would be the passage of some legislation permitting the boards of supervisors to place the towns upon the cash basis. Erie County is composed of twenty-five members from the city and twenty-five members from the country, and I do not believe that if it was left to a vote of the towns of Erie County that they by themselves will adopt the cash system. It takes too long to get them awake. After they once adopted it and tasted its fruits they would all be heartily in favor of it, but it is very hard to get the rural members to adopt new legislation, even for their own benefit. I believe that some legislation should be adopted to make it mandatory upon the towns to adopt the cash system, and until that is adopted there will be no movement or any great progress noticeable in the highways of the State.

Franklin County — WILLIAM F. O'NIEL — Two towns in our county have adopted the cash system, and they are well satisfied with it; in several other towns I hear they are about to do so. Of course, I have no means of knowing the wish of the majority of supervisors in the county as to whether a manda

tory law ought to be adopted, but personally I believe there is no other way. So far as I know the sentiment in Franklin County, it is in favor of the cash system, and I personally am in favor of a mandatory law.

Genesee County — DAVID CLARK — Genesee County is not working under the money system, and the roads show it. I myself would be in favor of adopting the money system; I would be in favor of adopting the money system from a business standpoint, because I believe at the time of year when the road work is ordinarily done there is not a farmer in Genesee County who can afford to put a day on the road for \$1, as at that time his farm needs attending to. This catch-as-catch-can and go-as-you-please manner of working roads is about played out. I believe that if any legislation established a money system we would all fall in line, but I could not speak for my county, as this matter has not been discussed largely with us. At the last session of our board we passed a wide-tire law, and we are in hopes something will be done to put this matter on a business basis, so there will be some method of improving the roads.

Greene County — M. O'HARA — Greene County has adopted the money system; I think last fall six towns voted in that way. The town I have the honor to represent has been working the roads under the money system for a number of years, and the good results obtained have been the means of bringing about the vote of the other boards of the county. We would not go back to the labor system under any consideration. We did not have any roads when we worked under the labor system, and we had no system or order. I do hope this law will be enforced, so that every town in the State will have to work their roads under the money-tax system. I hope the Legislature will see its way clear to enact such a law, and I know every member will be in favor of it. I hope it will be a State law.

Herkimer County — THOMAS WILLIAMS, JR. — We have four towns working under the money system. I understand there are several other towns to hold a special meeting this spring to bring about this result. I believe the sentiment in Herkimer

is in favor of it, and I believe that our people would be in favor of any legislation to benefit our system of highways.

Jefferson County — SETH MATHER — I think the time has come, perhaps, when Jefferson may change. I know under the old law that about all that is necessary to do a day's work on the roads is to hitch your team beside a fence and call it three days. We are of the opinion that the so-called Higbie-Armstrong act is defective, inasmuch as it will require two hundred years under the present appropriations by the State to construct the important highways of the State. I have an idea that the good-roads act, as presented here this afternoon, would be agreeable to my section of the country.

Monroe County — CHARLES G. SCHOEN — Monroe County is under the labor system, but we have with us to-day five delegates who are all in favor of the money system. What the rest of the board of supervisors is in favor of I can not say, but I think the only way to get good roads is the money system. As the gentleman behind me says, "They take a team out and hitch it to a fence and call it three days." With us they don't hitch the team to a fence, for it will stand without hitching. They hire a man to watch it and call it four days. I don't think it should be left to towns to vote whether they should have the money system, because a majority of them would vote against it. I don't think you would have the money system in all towns unless by act of Legislature.

Montgomery County — R. SCHUYLER — Montgomery County is composed of ten towns, and not one of these towns ever adopted the money system. The subject has been agitated by different members of the board of supervisors, who all favor the system, but no action has ever been taken. I think it would be an advantage to have the money system adopted for the benefit of farmer and also for the greater benefit of highways, and I heartily indorse the cash system.

New York — A. R. SHATTUCK — So far as I can speak for the county of New York, we are absolutely in favor of the money system.

Nassau County — WILLIAM WILLETTS COCKS — So far as Nassau County is concerned, we are entirely under the money system, and therefore I can not tell anything about the labor system. I am astonished that people are so ignorant of their own interests that they don't get on a money system, where they belong, with our own county of Nassau.

SMITH COX — As to the labor system, we have abandoned that long ago. We have had a good experience, and I advise the people in all parts of the State to abandon the old system.

Oneida County — JOHN D. DONNAFIELD — Thirteen towns have adopted the money system; each and every town that has adopted that system reports the most favorable result and are thoroughly satisfied. I can not say that I, as one, would want to make this a compulsory act. If it is a good thing the people will adopt it voluntarily, and what the people will adopt voluntarily is in better grace than compulsory.

Onondaga County — FRANK Z. WILCOX — In regard to Onondaga county, I feel that I am within bounds when I say that the county is in favor of the money system. We have nine towns out of nineteen in Onondaga that have adopted the money system, and this year, for 1901, will draw State aid of \$5,000 and over. The board of supervisors have adopted at different times several resolutions recommending the county to adopt the money system, and I think I can safely say that Onondaga county is in favor of the money system. I am sure that Onondaga county is in favor of a compulsory law for the money system.

Ontario County — IRA P. CRIBB — Personally, I am in favor of Mr. White's resolution. We expect to present the matter at the next town meeting. In the county we have but one town that is working under the money system. I wish it might be more. Just how the county may feel on that, I am unable to say.

Orange County — GEORGE MOSHIER — The delegates, including our assemblyman, are in favor of Mr. White's suggestion. In three years nine towns out of twenty-seven in Orange county have adopted the money system.

Orleans County — G. W. FITCH — Personally, I think the money system much preferable to our old system, and I think when our people become educated up to that point, that they will also be in favor of it, but it must be remembered, as was suggested, that this way of working the road tax is somewhat new.

Oswego County — JAMES R. OTTMAN — We all know it is the right system; we all know that it is as it should be. I think it is to our interest to pass legislation in some way making it compulsory.

Otsego County — ADRIEL G. MURPHY — So far as I am personally concerned, I believe the money system is the proper system. I don't know whether the people would want this law passed in the shape in which it is reported, but I think if the money could be used judiciously, if it was passed, the people would agree with it. As far as I am personally concerned, I am in favor of it, and I believe that my town is.

Putnam County — HENRY MABIE — We have six towns in our county, three of which have availed themselves of the provisions of the Fuller act, and the other three have not as yet. I am a firm believer in that method of working the highways. I am perfectly willing to compel those three towns to adopt the money system by State enactment.

Queens County — WILLIAM WILLETTS COCKS — We were one of the first counties to indorse the money system, and Queens County is certainly in favor of good roads. The object lesson in Queens County ought to be sufficient to convince almost anyone who has given it careful study. Our farmers will testify that good roads are an absolute necessity.

St. Lawrence County — CHARLES S. PLANK — As far as St. Lawrence County is concerned, we have worked the highway system, and it has been under the old, antiquated plan of working out highway tax, but for the last several years there has been an agitation and change of sentiment which is very noticeable — it has, I think, been felt that there is a growing and prevailing sentiment in favor of the money system. Five towns

in our county voted on the money system, and in all but one it was carried, and in that one it was a tie. From reports received from nearly every town in the county and what the supervisors say about it, I am sure in the near future we will have a money system in the entire county. I have no doubt but that they all would be willing to favor the proposition here to-day.

Saratoga County — GEORGE H. WHITNEY — We have but one town in our county that has adopted the system to improve its roads under the Fuller act. I understand the system is very popular. Personally, I am heartily in favor of this system, and I think in saying this that I express the sentiments of the town I represent. So far as the other eighteen towns are concerned, I will say this much: We adopted a resolution at the last session of the board urging each supervisor to use his influence for the Fuller act. I should be in favor of the passage of an act by the legislature compelling boards of supervisors to adopt this money system.

Rensselaer County — D. A. HEALY — AS far as the system is concerned, I am not acquainted with it, but would say what will suit the majority will suit Rensselaer. [Mr. Healy entered the convention as his county was called and did not hear preceding remarks.]

Schenectady County — GARRETT W. FRELIGH in his remarks dwelt on the competency of the highway commissioner to properly perform the work, making no allusion to the money system.

MR. HOAG — There is only one way to remedy the existing evils, and that is by the adoption of the money system. If a man is opposed to the money system, and you ask him why he is opposed, you will find that the man wants to go on the road and save a dollar and not earn a dollar. The present law should be repealed, and if this body should recommend to the Legislature the money system, I think it would be one of the greatest acts of the age.

Schuyler County — C. H. SMITH — Personally, I am in favor of the money system, and I heartily think that Schuyler county is in favor of it.

Seneca County — CHARLES S. FARR — We are still working under the labor system, but I think the sentiment is in favor of the money system. I think we should have a State enactment to hurry the matter along, and not take a hundred years or so.

Suffolk County — MR. MAYLOR — I voice the sentiment of the town when I say we are in favor of the money system.

Tompkins County — JOHN L. MANDEVILLE — I not only believe in the money system now, but I have believed in it a good while. I have agitated it for a dozen years. I think it is better to retain the law just as it is than to obtain further legislation at present.

Ulster County — HENRY MCNAMEE — In speaking for Ulster county, I desire to state that there are two towns in our county now working under the Fuller system. One of these towns has had the system for three years, and from reports received it is a good thing. During the last session of our board the question whether the whole county should not be obliged to adopt the Fuller system was brought up, and the members thought that a law could be passed by the Legislature this winter making it mandatory upon every county to adopt the Fuller system. We hope, the members and myself, that a law will be passed to make it mandatory upon the boards of supervisors of the several counties to adopt the Fuller system. If they do not the county of Ulster will unanimously adopt it.

Warren County — ROBERT T. TAYLOR — I am one of the representatives from Warren county, which has eleven towns, and they never have in any one of these towns attempted to adopt the money system. There are three representatives from Warren county here, and all three are in favor of the money system, and so are a majority of the board of supervisors in Warren county.

Westchester County — JOSEPH B. SEE — I am heartily in favor of the money system, but not in favor of compelling every county to adopt it, as I think that if they are foolish enough to work under the old system they should suffer the consequences.

Orange County — C. H. WYGANT — I don't know but that I will have to agree with Mr. See, and say, "Vote against the resolution."

W. PIERPONT WHITE — Mr. Chairman and gentlemen, I am going to offer a resolution which will test the sentiments of the delegates present. May I ask you in recording your vote to forget for the moment that you are supervisors, highway commissioners, and members of assembly? May I ask you to express your individual feelings so that it may be recorded? Not what you think is necessary to be done in order to satisfy your constituents, but what you individually believe will be for the interest of your State and your county. On these lines I offer the following resolution:

Resolved, That this highway convention direct its committee on legislation to prepare and urge the passage of a bill to make the money system apply to all the counties in the State after January 1, 1903, on the same terms as now provided by the Fuller bill — that is, 25 per cent of the money to be raised should be paid back to the towns.

Mr. CONBOY — I would like to ask Mr. White how he proposes to bring this about.

Mr. WHITE — By drafting a bill on the same terms as the Fuller bill, leaving the Fuller bill on the statute books; draft a bill and start it on its passage, and see if it would be possible to pass it at this session of the Legislature.

Mr. HOLCOMB — I believe home rule ought to apply, and I move to amend the resolution offered by Mr. White, if I understand it, substituting that this convention ask the present Legislature to pass a law compelling each town in the State of New York which has not already adopted the money system to vote upon that proposition at the next election.

The CHAIRMAN — The question is upon the amendment offered by Mr. Holcomb.

The amendment was lost, and the vote was taken upon the original resolution, which was adopted.

Mr. WILCOX — In order to expedite business, I desire to offer the following resolution:

Resolved, That in accordance with the recommendation of the standing committee there shall be appointed by this convention a standing executive com-

mittee to be composed of two members from each of the eight judicial districts of the State, and that nominations for said committee shall be made at meetings of the delegates representing the counties composing each of the several judicial districts of the State.

The resolution was adopted.

Mr. CONBOY — I offer the following resolution:

Whereas there has been introduced and is now pending in the legislature a bill known as "Assembly bill No. 213," entitled "An act to amend the highway law relative to extraordinary repairs of highways and bridges," which amends the present law so as to take from the town board and the officials of the towns elected by the people for the purpose of caring for the roads and bridges in their several towns the power to perform the duties which they are elected to perform and vests in the State engineer a controlling power for the building of bridges, which is contrary to the best interests of the people of the towns; therefore,

Resolved, That we, supervisors of the State of New York, in convention assembled, do respectfully protest against the enactment of the bill above mentioned, and that the senators and assemblymen be urged to use all honorable means to defeat the passage of the bill, and that copies of this resolution be sent to the senators and assemblymen.

The resolution was referred to the committee on legislation.

Mr. LYON — I move that a discussion regarding the provisions of the Higbie-Armstrong act and some questions regarding the theories of bonding be made a special order for discussion by this convention to-morrow morning at 10 o'clock.

The motion was carried, and the convention adjourned at 4.10 p. m.

WEDNESDAY, JANUARY 29, 1902 — MORNING SESSION.

The convention was called to order at 10.30 a. m. by Chairman O'Niel.

Mr. WILCOX — Your committee on business would respectfully report as the order of business for January 29th the following:

First. Discussion of the bonding system for the construction of roads under chapter 115 of the laws of 1898, known as the Higbie-Armstrong bill, to be opened by Hon. Edward A. Bond.

Second. The subject of wide tires. The discussion to be opened by Frederick M. Power, esq., of Onondaga.

Third. A paper by Edward P. North, of New York, upon the "Relations between macadam roads and electric street railways."

Fourth. Paper by ex-Senator Dodge, Director of the United States Office of Public Road Inquiries, upon the subject of "Highway improvement by State aid."

Fifth. "The relation of common roads to railroads," by Prof. Lewis M. Haupt, of Philadelphia.

Sixth. Miscellaneous business.

Seventh. Adjournment.

The report of the committee on business was adopted.

The **CHAIRMAN** — The business before us this morning is the special order of yesterday, the provisions of the Higbie-Armstrong act, and some questions regarding the theories of bonding.

Mr. LYON — In order to proceed regularly, I would introduce this resolution:

Resolved, That we request the Governor and legislature to grant an appropriation of \$1,000,000 this year.

Mr. MATHER — In voting on this question, I would like to ask whether each county is entitled to one vote, or whether the vote will be by different representatives of this organization. In taking this vote one county might have several votes and another county perhaps not have more than one or two, so I would ask if the expression is to be made that each county have but one vote, because you wouldn't get a proper expression from the State if one county carried ten votes and another county one.

Mr. SEE — I would request that the resolution be amended to carry \$1,500,000.

The CHAIRMAN — This convention is not an official convention; it is in its character voluntary. There isn't anything binding upon anybody in our action here. We are simply as citizens requesting the Legislature to appropriate money, and therefore the chair would hold that every member of this convention would have a right to vote upon the question.

After remarks by Mr. See on the amendment, stating facts in regard to the county of Westchester, a vote was taken and the amendment was defeated.

The original resolution was then adopted.

THE BONDING SYSTEM FOR IMPROVEMENT OF HIGHWAYS.

The CHAIRMAN — The next order of business is the discussion of the bonding system for the construction of roads under chapter 115 of the Laws of 1898, known as the Higbie-Armstrong bill, to be opened by Hon. Edward A. Bond.

EDWARD A. BOND, of Jefferson County, State Engineer of New York: Mr. President and gentlemen, I hope I will be pardoned if for a moment I revert to my own county of Jefferson. I find one of the encouraging features in the progress in the interest of good roads is the fact that this year we have some delegates from that county. The first convention that we had my county did not do me the honor of sending any delegate at all. This year we have three, and I find that time has touched their heads somewhat. One has a silver crown, and the other says that he is reaching the goal steadily, where there is no more parting. Our northern county of Jefferson, which wouldn't send a delegate three years ago, last year sent two, and this year three. Within the last year they have made an application for a highway and submitted it, and it was voted down by the board of supervisors because of fear that the roads in that section wouldn't stand up under our manner of road building. I hope to be pardoned if for a few moments I address my conversation to delegates of my own county. What I will say to

my own county will equally apply to perhaps every county in the State. In the building of roads in the many counties we meet all sorts of conditions. For instance, in this county of Albany, where we are, we have the worst sand to contend with in any county of the State. Within five miles of this point we have the worst clay to contend with in any county of the State. We have clay that has been gullied out by the action of the water for years. An old road went down this steep bank or gully with a grade of 14 to 16 per cent. We have changed these grades to 5 per cent. We have done this where there has been a mountain of clay some 200 feet at some points, this clay probably being 300 feet in depth. The clay is such that it is suitable for building bricks, a clay that is as bad as in any county of the State. We built roads there with six inches of macadam that will stand any weather—and with the ordinary improvement of maintenance, which must go on these roads or any other roads—roads that are indestructible if you maintain and put on the amount each year that is worn off.

To come back to our own county once more, I wish to remind the delegates of some of the things I have seen in old Jefferson. Some one yesterday spoke of hitching a horse or a team to a fence and charging three days for it. I did not happen to see that, but whether that is true or not, I have seen this: In a village in Jefferson county that I have been through there were scattered along the road stones probaby the size for a man to handle from hand to hand. Along this road were old gentlemen with their hammers, sitting there with cushions, breaking up these stones. These men were earning \$1 a day, and were earning it honestly. They break these stones and break them well. After being broken the stones are left there and not rolled, as it is expected that the traffic along the road will make a good stone road. What is the consequence? All through the summer you will find people driving in a ditch on one side of the road, and then crossing over to another point and go in a ditch, because it is a little better. All summer long they keep traveling in a ditch until fall comes, when the

roads are so bad they are obliged to go on stones, and so they go on these stones from year to year. What is true in Jefferson is probably true in every county in the State, and I bring this up as an illustration. I want for a moment to describe our method of road building.

The first step in the preparation of plans for good roads is the survey, which, if properly done, will improve the grades from, at times, 10 to 20 per cent., changing the location of the road, to reduce them, to 5 or 6 per cent., or better. After the map and profile are once made the engineer carefully locates the grade of the road, so that as nearly as possible the excavation from rock and earth cuts will form the necessary embankment, always keeping in view the proper drainage of the road, allowing for ditches on either side of the finished road to be from 2 to 2½ feet below the crown, with plenty of culverts, either open culverts, box culverts, or cast iron or vitrified pipe drains, sufficient for the water to quickly flow away in case of heavy rainfall or sudden winter thaw.

In laying the grades the engineer does not necessarily seek to find long continuous grades of a given percentage, but permits of undulating grades, always bearing in mind, however, to make the percentage of the grade as low as is consistent with the surrounding conditions. The roads are graded for receiving the macadam surface, varying from twelve to sixteen feet in width, and under unusual circumstances they are sometimes for short distances made twenty feet in width. The lower surface is graded to conform to the exact crown of the road when finished, and is graded so at all times to be an equal six inches below the macadam surface. After being properly graded, a 10-ton steam roller is placed upon it, and it is thoroughly rolled about five or six times, and if this rolling develops soft spots in the earth, this earth is to be removed and other earth put in its place, so that the whole earth surface is of one consistency throughout any given section of the road.

At times very deep sand is met with that requires a dressing of shale rock or clay to cover it, and also a similar material to

provide wings on either side of the macadam to properly hold the macadam surface in place.

In laying the stone for these roads we usually select the best native stone in the immediate neighborhood for the lower course. These stones are drawn to an ordinary rotary or jaw stone crusher, and after being crushed are elevated to a rotary screen that separates the stone into three separate grades; $\frac{1}{2}$ to 1 inch in one compartment, and 1 inch to $1\frac{1}{2}$ inches in another, and $1\frac{1}{2}$ inches to 3 inches in another; the screenings from dust to one-half inch in size being kept separate. In a section where there are ledges of rock and knolls of rock cutting to be excavated for easing the grades, often this rock is suitable to be used in the lower course.

When we first began to build roads the product from $\frac{1}{2}$ inch to 1 inch was a waste product, but more recently we have used this product of the crusher for the bottom course on the sub-grade, simply stipulating that it should not in any case occupy more than one-third in thickness of the base course. The base course is made of screen stone $1\frac{1}{2}$ to 3 inches in size, and, with the product of $\frac{1}{2}$ to 1 inch, as above described, is put in a course of $5\frac{3}{4}$ inches in thickness, loose. We then pass a 10-ton steam roller over this stone, beginning on either edge, and rolling toward the center of the road, rolling the whole of it about six times, thus knitting the stone together in one compact mass. After this, about one-half inch in thickness of the screenings, as above described, is placed on this stone. The roller is then passed over it five or six times. We then take an ordinary road sprinkler, and sprinkling ahead of the roller, rolling and sprinkling the road, adding screenings or the dust where required until the whole lower course is filled to the surface with screenings, making one compact mass 4 inches in thickness when finished.

The top course is formed of stone from 1 inch to 2 inches in size, and about $2\frac{3}{4}$ inches of loose stone are put on the road and the roller passed over them as described in the first course some five or six times, and then screenings are added, as in the

first case. Then follows the sprinkling and rolling until the top course is welded into the bottom course, and the two are thoroughly filled with screenings, as above described, making a compact mass 6 inches in thickness when finished.

The earth wings on the road are usually from 3 to 5 feet on either side, making a 12-foot road, either 18 or 22 feet in width from one ditch to the other, as the case may be, and any other road the additional width of the macadam surface. In a dry season of the year, or when the road is first opened after traffic, we usually put an extra coat of stone dust or sand about one-half inch in thickness on top of the finished road. The most desirable stone we have found for the top course for these roads is the Hudson River trap rock, and in all sections of the State where it is convenient to be reached by canal this is generally specified, unless it is in exceptional cases, where we find a hard and durable granitic rock near the road to be constructed which will answer the purpose.

These roads have sustained the ordinary travel of a country district, leading to a populous city, for four years; some of them have been through a section of country having a sand subsoil for part of the way and another portion of the road on the side hill of a precipitous gully of brick clay.

Some persons have questioned whether in northern New York roads of the character herein described would withstand the extreme cold weather on a clay soil without being ruined by the action of the frost. Our experience has been that a road built as herein described, with the proper care and provided with rapid and successful drainage, will withstand the climate and clay soils of any portion of our State.

At some points in the State we have built this top surface of gravel instead of stone, as heretofore described. We have met with great success with these gravel roads, particularly with one in Columbia County, near the Massachusetts State Line.

I am not in a position to personally advocate the appropriation of money; I am not in a position personally to advocate any special line of legislation. The duties of my office are purely

executive. When the legislature appropriates money for a specific purpose, that is to be handled through my department, it is my duty, as an executive officer of that department, to handle that money in the most economical and honest way, to the best interest of the State. The following extract from my annual report for 1901 is given you to show what can be done with \$10,000,000, so that you can intelligently discuss the question as to whether it is wise to bond the State of New York for \$10,000,000 for good roads or not:

SUGGESTED BONDING SYSTEM.

While great progress has been made in the work of improving our public highways, it has been suggested that some method should now be adopted by which a system could be put in operation, for the purpose of improving within a very few years such a part of the principal roads in the State as would be of most benefit to the greatest number of citizens, and that this improvement should be conducted in a more expeditious manner than is now possible. To do this would require a larger annual expenditure on the part of the State than has yet been made, and if paid at one time would impose a larger burden upon the State than it would be wise to inflict in one, two, or even five years. The work which is being done is not only for the present, but for all time; and many, therefore, advocate an issue of State bonds for the purpose of improving our public highways under the provisions of the present State-aid act, claiming that this would fulfill two important requirements—first, there would be immediately available a sufficient sum to provide for the improvement within the next three or four years of a large proportion of the principal roads which are worthy of improvement, and, secondly, it would distribute the cost of such improvement over a term of years, making the annual payment so small as to be scarcely perceptible, and allowing those who would benefit by the work in the future an opportunity to help pay for its construction.

The funds derived from the sale of these bonds could be used for the purpose of paying the total cost of improvement of highways and the counties' share could be returned to the State in payments extending over a term of years equal to that over which the bonds extended.

With these points in view, the suggestion has been made that the State of New York should issue bonds for \$10,000,000 to be expended in the improvement of public highways in accordance with the provisions of the so-called State-aid act, namely, chapter 115, laws of 1898, these bonds to be payable at the expiration of seventeen years, bearing 3 per cent. interest, and conditioned upon an equal annual payment which would meet both principal and interest at the end of the seventeen year period. The money raised by these bonds, or so much thereof as might be necessary, would be immediately available and the improvement of public highways in the State could be carried on in a very expeditious manner, and one-half of the cost could be repaid to the State by the counties, making a total net expenditure by the State at large of only \$5,000,000.

The average annual payment which would be required to retire such a ten-million bond issue, both principal and interest, would be about \$760,000, being a

State tax of not to exceed 6 cents per \$1,000 based on present conditions, and assuming that each county received its pro rata share a county tax of not to exceed 17 cents per \$1,000 for the above period of seventeen years.

| With this amount of money available the work of improving our public highways could be taken up in the most advantageous and systematic manner; and it is claimed that a system of roads somewhat as shown on the map hereto appended would prove of incalculable value to every citizen of the State, combining as it does a line of continuous roads connecting the extreme ends of the State and also a network of roads connecting many of the county seats of the several counties. It is not claimed the roads as shown on the map are those most needed at the beginning, but the map is intended to show what could be accomplished in case the citizens of the State should look upon this project favorably, leaving the exact location in each county to be determined after consultation with its citizens. (See Pl. XIII.)

This plan would meet the wishes of many advocates, while many others claim that in these days of easy and quick communication between distant points by means of steam and electricity there is not the same necessity for long and continuous highways alone as was the case in the past, when the only means of communication was by way of boat and roads. Radiating from each of the principal cities and villages, and acting as the main arteries through which comes a large proportion of the travel of each separate county, are usually a few principal highways, which in turn are tapped at frequent intervals by cross roads. A network of roads connecting all of the county seats of the several counties (with the exception of those localities where communication is rendered extremely difficult or impossible by reason of forests or mountains, or where the travel is so limited as not to warrant the necessary improvement) would undoubtedly accommodate nine-tenths of the travel, and would accomplish the required result—namely, the greatest benefit to the greatest number.

The roads, as shown on the map which accompanies this report, with such modifications, of course, as would be required after a careful study of each locality, should be first constructed as speedily as possible. A study of the map will show, also, that in improving the roads connecting the county seats long, continuous highways connecting the extreme portions of the State would be formed at the same time, as well as continuous roads crossing the State both at right angles and obliquely.

An expenditure of \$10,000,000 would construct upward of 1,250 miles of improved macadam road. Following along those counties which have thus far filed petitions for the largest amount of improved roads, it would seem that the first work should be taken up by connecting the counties running through the eastern, central, and southern portions of the State. This would naturally form a continuous road from New York City, by way of Albany, to Buffalo; from Albany to Rouse's Point; and from Nyack, in Rockland county, through the southern tier of counties, to Mayville, in Chautauqua county, aggregating altogether about 1,090 miles. These roads could, with proper management, be economically and successfully constructed within three or four years, and the improvement of the remaining lateral roads connecting the county seats, as shown on the map, could then be taken up. Out of the \$10,000,000 fund there would be left sufficient for the improvement of about 160 miles of these lateral roads, which, added to the 175 miles of improved roads already completed and in process of

construction, and for which funds have been provided, and which would be utilized in forming these lateral roads, would make a total of about 1,425 miles, or about one-half of the entire mileage, as shown on the map.

This would permit the construction of one-half of the roads shown on the map within three or four years from the time the money would be available, and the balance could be provided for as public sentiment called for it.

The possible location of the roads to be improved under this plan would be as follows: Beginning near the New Jersey State line in the county of Rockland and following through that county and Orange county to Newburgh; thence running westerly through the county of Sullivan, which is a section visited by many persons during the summer months, it being one of the health resorts of the State; passing on through Deposit, on the Delaware river, in Delaware county, westward to Binghamton, Owego, Elmira, Corning, and Bath, with roads diverging from Binghamton to Auburn and from Auburn on to Lyons and Rochester, running obliquely in a northwesterly direction. From Elmira a branch road passes through Watkins, at the head of Seneca lake, and continuing westward from Bath passes through Belmont, in Allegany county, and through the center of Cattaraugus county to Little Valley, its county seat; it then continues westerly to Mayville, with a loop around Chautauqua lake, taking in the city of Jamestown. From Binghamton to Bath this road passes through a wide and fertile valley, which is occupied at different points by the Susquehanna, Chemung and Canistota rivers.

From Elmira a road passes in a northerly direction, bearing somewhat to the westward, in nearly a straight line to Rochester, passing through Watkins, Penn Yan, and Canandaigua, or the road running in a northwesterly direction from Bath to Geneseo, passing through Batavia, Lockport, and thence to Buffalo, could be used if desired. This last line from Bath to Lockport or Buffalo is one of unusually easy grades and through a very rich section of farming country.

From Bath westerly to Belmont the road crosses the divide between the Canistota river and the Genesee river; again from Belmont to Little Valley, in Cattaraugus county, a divide between the Genesee river and the Allegheny river is crossed; and from Little Valley westward to the northwestern end of Chautauqua lake the road passes from the valley of the Allegheny river to the divide between the waters of Lake Erie and the Mississippi river, the loop continuing around Chautauqua lake to the city of Jamestown. This section is very delightful, and is one much appreciated by persons seeking summer homes and outings, and has a National reputation.

Another road starts at Kingston, and, running a little northwest, follows the Esopus creek to the headwaters of the Delaware river, from whence it continues in the same direction to Norwich, in Chenango county. If desired, this road could be diverted to a northerly direction from Delhi to Cooperstown, at the foot of Otsego lake, the home of Fenimore Cooper, and one of the many beautiful summer resorts of the State, and from thence northwesterly to Canandaigua lake (or Schuyler lake), at the head of which is located Richfield Springs, one of the summer and health resorts, and from Richfield Springs the road could run northwesterly to Syracuse, or more northerly to Utica, as may be desired.

From Norwich the road beginning at Kingston passes through Cortland and continues westerly through Ithaca, at the head of Cayuga lake, and so on to Watkins; thence either westerly to Mayville or northwesterly to Rochester, as hereto-

fore described. From Cortland a branch road leads in a northwesterly direction to Auburn, thence to Lyons and Rochester, and so on westward by way of Albion and Lockport to Niagara Falls, Tonawanda, and Buffalo.

A study of the map shows a direct line from Little Valley to Buffalo, and also a direct line from Mayville to Buffalo.

Starting in Westchester county, at White Plains, a road passes up the east side of the Hudson river through the counties of Westchester, Putnam, and Dutchess to a point opposite Kingston, passing through the county seats of the last three counties; thence to Kingston, or, if preferred, from Carmel to Newburgh, and thence up the west side of the Hudson river through Kingston to Albany and Troy, with a branch line from a point opposite Catskill through the city of Hudson to New Lebanon and the State line of Massachusetts (being the northeast corner of Columbia county), at which point the road joins the improved State roads of Massachusetts leading to the city of Pittsfield, and so on through that State, a branch line from this point also running in a northwesterly direction to the city of Troy.

From Albany or Troy a road passes through Schenectady, Amsterdam, and Fonda, with a branch road from Fonda through Johnstown and Gloversville to Lake Pleasant. Returning to Fonda, a road continues west from that point through Little Falls, in Herkimer county, Utica, Rome, Oneida, and so on to Syracuse, with a branch road from Rome, passing through Boonville and Lowville to Watertown and thence to Alexandria Bay. Starting from Syracuse one road passes northwest to Oswego, while another from Syracuse runs almost due north to Brewerton, Pulaski, Watertown, and so on to Alexandria Bay. Continuing westward from Syracuse the road would again lead through Auburn, Lyons, Rochester, etc., to Niagara Falls and Buffalo, as described over another line.

A road is also shown running from Watertown northeasterly through Philadelphia and Antwerp to Canton, with a branch road from Canton to Ogdensburg; from Canton easterly to Malone and Plattsburg; thence south through Elizabethtown, the county seat of Essex county; thence almost due south, through the valleys of the Bouquet and Schroon rivers, to Schroon lake; thence along the shores of that lake and through the valley of Schroon river to Warrensburg; thence on to Caldwell, at the head of Lake George; from there to Glens Falls and Greenwich, in Washington county, and on to Troy.

From Glens Falls a branch road leads southerly to Saratoga Springs, Ballston Spa, and Amsterdam, there joining the other system. The road taking in the belt of northern New York, as described, from Watertown to Saratoga Springs, together with a comparatively direct line leading from Lowville almost due east to Crown Point, passing through Lewis, Herkimer, Hamilton, and Essex counties to Lake Champlain, embraces all of the varieties of beautiful scenery for which this State is noted, from that of the Thousand Islands in the St. Lawrence River to that of the North Woods and the Adirondack region, as well as the beauties of Lake Champlain and Lake George.

This suggested improvement, as shown in this way, and the effect of issuing bonds of the State for \$10,000,000, as herein described, is outlined for the purpose of acquainting the citizens of this State with the possibilities of what can be done if after deliberate consideration such a system is deemed advisable.

Mr. LYON — I desire to present the following resolution. This, gentlemen, is a resolution that I consider of vast importance, and I would ask that each and every one of you give careful attention to the reading of the preambles and of the resolution itself.

WHEREAS, Legislation for the maintenance of the commercial supremacy of the state of New York is now pending tending to the enlarging and deepening of the Erie Canal; and

WHEREAS, Great values in property are created at either terminus of the canal, and the cities of New York and Buffalo, in return to the State at large for the commercial supremacy which is given to them by the deepening and enlarging of the Erie canal, pay 86 per cent of the entire State tax; and

WHEREAS, The deepening and enlarging of the Erie Canal enables the State of York to control the price for the transportation of freight on the railroads of the State during the eight months of the year that the canal is open, thus benefiting the residents of the entire State; and

WHEREAS, The cheapening of transportation of farm products from the West to the East brings the farm products of New York State into keen competition with the farm products of the West; and

WHEREAS, In recent years the tonnage transported on the Erie Canal in any one year has not exceeded 4,000,000 tons, while the farm products raised in the State of New York equal or exceed at least 12,000,000 tons; and

WHEREAS on January 1, 1902, 1,308 miles of road were petitioned for improvement in the State of New York, of which 59 miles were built, 109 miles were under contract, and 238 miles were waiting an appropriation on the part of the State of \$1,000,000, the counties having appropriated \$960,000, being their share, and as the amount which the State can appropriate from its annual income is so uncertain, thus making the time for the completion of the roads so far distant; now, therefore, be it

Resolved, That we, the delegates at the third annual convention in the interest of road improvement, held in Albany, in the State of New York, on this 29th day of January, 1902, direct our standing committee to prepare and introduce the necessary bills to be enacted into laws to permit the State of New York, either at the fall election in 1902 or at some subsequent time, to submit a referendum to the the people of the State to vote on the proposition that the State of New York issue bonds to the amount of \$10,000,000, at 3 per cent interest, and that the State comptroller be authorized to issue and sell said \$10,000,000 bonds from time to time as the counties in the State may desire to improve their highways under the Higbie-Armstrong act, being chapter 115 of the laws of 1898, thus providing a constant fund to meet the State's share of road improvement.

We recommend the passage of the above legislation in favor of road improvements, as we believe that by the improvement of the main highways of the State of New York the cost of transportation, which is now estimated at 25 cents per ton per mile for farm products, can be so reduced that the raisers of farm products will be enabled to better compete at a profit with the farm pro-

ducts of the West than they do to-day and at the same time maintain the commercial supremacy of the State of New York.

The CHAIRMAN — The chair regards this proposition as the most important that has come before this convention, and thinks that we ought to have a general expression from the delegates here present upon the proposition.

Mr. LYON — I move that a call of the counties be taken and that a time limit of not to exceed five minutes be put upon the discussion.

The motion was adopted, and the call of the counties was proceeded with, as follows:

EXPRESSION OF SENTIMENT BY COUNTIES ON THE BONDING SYSTEM
FOR ROAD IMPROVEMENTS.

Albany County — Dr. EDWARD J. BEDELL — On behalf of this resolution, in the interest of Albany County, I wish to give my hearty assent to every word of it. Albany County, during the past session of the board of supervisors, has made provision whereby to bond the county of Albany for \$500,000, and we surely are in favor of bonding the State for \$10,000,000.

Broome County — B. B. BADGER — I regard this as the most important piece of legislation that has been proposed in many years. I for one have advocated this in a small way for a number of years, and I assure you with pleasure I support the resolution.

Chemung County — CHARLES CHAMBERLAIN — In regard to this resolution I can not speak for the sentiment of my county, as it has come up since I left home. I have no doubt but that our county would be in favor of this proposition. We are contemplating asking for roads, and the great drawback has been how long it would take us to get them. I myself, as a delegate, would be heartily in favor of this bond system.

Chenango County — CHARLES G. BROOKS — I would say for myself and for the other representatives that we are in favor of the bond plan.

Cortland County — N. F. WEBB — I am well pleased with the looks of the map, and I would like to live long enough to see the lines filled with macadam road, so we could get from one end of the State to the other on the highway. I believe that I can speak for the people of Cortland County, and say that we would be heartily in favor of this resolution. We have got to have money to build these roads, and this seems to be the most advisable and fair plan.

Dutchess County — E. LYMAN BROWN — As a representative of Dutchess County, I think I will voice the sentiment of our people when I say they would be heartily in favor of the proposed plan.

Erie County — JAMES A. WOODARD — I would like to say in behalf of Erie County that I believe the sentiment is, we would be more than satisfied if a bill of this character were passed. I think it would have the unanimous consent of the board of supervisors of Erie County, and also of the people of Erie County.

Franklin County — WILLIAM F. O'NIEL — I regard this proposition as the only advisable solution of the good-roads problem.

Genesee County — DAVID CLARK — It seems to me that the people of Genesee County or any other county wouldn't object to bonding the State to open and maintain macadamized roads for their own accommodation; to get their own grain to the sea-ports or to the railroad station, as the case may be; and to cheapen the transportation of the products of their own soil. I believe that Genesee County would stand for bonding the State to improve their highways.

Greene County — M. O'HARA — I heartily indorse that measure of raising money to improve the State roads. It looks to me as if that was the only advisable way to get at it. I voice the sentiment of our county in that respect.

Jefferson County — SETH MATHER — Yesterday, as I understand it, we were all Fuller men; to-day we are Higbie men — Higbie-Armstrong men. I am just the same to-day as I was yesterday; and as far as this proposition is concerned, I am against it, and I will tell you why. How many farmers there are in this

room I don't know, but I do know when the taxes are paid who will have to pay them; and I know, too, that a man upon a farm has about all he can do to make the 6 per cent. on his investment, and he will do pretty well if he does that. If I have figured this correctly, the Armstrong-Higbie law is a good thing for cities, for all the citizens that are in favor of it; but as far as the country is concerned, the claim being that it does not have to pay the taxes, I think you will find as the laws are shaped to-day that the farmer will have to pay. As far as I am personally concerned, I wish to be quoted still that I am against this bonding, and I am a Fuller man to-day, as I was yesterday.

Monroe County — CHARLES G. SCHOEN — I have listened to a great many speeches in our board of supervisors, and I am satisfied by those speeches the members are in favor of doing most anything for good roads. I am satisfied that they are willing to bond the State for this amount of good roads, and I think we are all heartily in favor of it.

Montgomery County — R. SCHUYLER — I can say for the people of Montgomery County we are all anxious for the improvement of the highway. I represent the town of Mohawk, and in regard to the farmers' opposition, I will say there is no such a thing. I have been annoyed during the past year by their asking why there was not some improvement of the highway, and the only answer I could make was that the State has not appropriated liberally enough to reach us. I know the town of Mohawk, and the supervisors of the county of Montgomery are anxious for an appropriation to better the roads.

Nassau County — WILLIAM WILLETTS COCKS — Nassau County has bonded itself for the money used in the construction of its roads, and the assessed values have greatly increased on account of the fine roads. We are going to vote with the majority to help you get good roads, and I want to impress upon you the idea that, where you can not get State aid, it seems to me the towns should build those roads themselves. We are going to vote for the appropriation.

New York County — A. R. SHATTUCK spoke in regard to the excellent work done in New Jersey and Massachusetts, and at some length of the good results that could be obtained in New York State. He said: As far as I can speak for New York County, I am in favor of the scheme.

Oneida County — W. PIERREPONT WHITE — Oneida County desires to be recorded in favor of bonding.

Onondaga County — FRANK Z. WILCOX — It strikes me that this bonding scheme is the only way. I don't know how we are going to get good roads unless we have just such a scheme as this. If we have the bonding scheme at once and do the work at wholesale, and put through the State lines of road, that the people can use from one end of the State to the other, we shall reap great benefits therefrom. I am sure Onondaga County would be in favor of the bonding scheme, so that we might possibly get good roads within a lifetime.

Ontario County — IRA P. CRIBB — The town I have the honor to represent has twenty-three miles of improved road. It has done this under a system of its own, and the towns in Ontario County enjoy the improvements we have made. Every delegate from Ontario County is in favor of this scheme.

Orange County — C. H. WYGANT — It is not necessary for me to speak for Orange County. She has already spoken for herself on the matter. We have provided for the bonding of the county for \$200,000, which would be our full share.

Oswego County — JAMES R. OTTMAN — I am a farmer from a farming county, and when I see that the gentlemen representing New York County, Erie County, and the counties that contain our large cities, realizing that they pay a large proportion of this tax, are anxious that we accept it, I should be ashamed if I should vote against the proposition. I would be ashamed to say I did not favor it. I voice the sentiment of my county when I say we are thoroughly in favor of this appropriation. I think it will do more good than any act in recent years.

Otsego County — S. E. ARMSTRONG — I think that while Otsego

is in favor of good roads and wants them, I don't think they are in favor of this Higbie-Armstrong plan, for the reason it costs so much; but it seems to me my county would be more in favor of the State paying more under the Fuller system. If they would give us fifty cents on the dollar, the same as they do under the Higbie-Armstrong act, and let us build roads that cost less per mile, it would do us a great deal more good.

Saratoga County — GEORGE H. WHITNEY — I would say I am heartily in favor of this scheme to bond the State for the benefit of the roads, and I think if the proposition is submitted to the people it will receive substantial support from Saratoga County.

Ulster County — HENRY McNAMEE — Ulster would vote in favor of the resolution. We have a number of State roads in our county. We know what they are, and we want more. We believe this is the only way to get them.

Westchester County — JOSEPH B. SEE — I am in favor of bonding the State both for good roads and for canals. I am a little more in favor of roads than I am of canals.

THE LEAGUE OF AMERICAN WHEELMEN AND THE "GOOD ROADS" LAW.

WM. PIERSON JUDSON, of Oswego, Deputy State Engineer: Mr. Chairman and gentlemen, I see with us a representative of the League of American Wheelmen, which is the organization which began the good-roads movement in New York State, it being a matter of history that the original campaign of education for good roads was started in this State by the members of this organization, and that the law under which we are working was passed by their influence. I think we should now hear from Mr. Washburn, who is the chairman of the highway improvement committee of the New York division of the League of American Wheelmen.

LUCIUS H. WASHBURN, of Albany: Mr. Chairman and gentlemen, I have the honor of representing the New York State division of the League of American Wheelmen, being the chairman of the highway improvement committee. While the league has not given me any specific instructions in regard to the mat-

ters coming up before this body, its standing in the history of good roads in the State of New York is such as to place its position beyond any question. If we can give Mr. Bond the title of "the father of good roads," then my organization can claim the title of "grandfather."

When we started to agitate the improving of the highways in the State of New York we found that outside of the cities themselves there was practically no sentiment in favor of good roads. The average man in the country was satisfied with the roads that his grandfather built. Through our different committees and our publications and our meetings, and keeping in touch with the bicycle clubs which were formed as wheeling interests advanced, we have done an immense amount of missionary work, and we feel that without our work a meeting such as this could hardly have been possible. I say this about the League of American Wheelmen, because I want the men here to understand what that organization has done. I can the better throw bouquets at my organization, because I was not a member of it at that time.

The League of American Wheelmen, since its inception, has constantly stood for highway improvements, and has originated or advocated every bill that has come up. We have had our representatives here at Albany every winter since 1882 or 1883. We have introduced our measures, and have had them knocked down again and again, and by-and-by got them through. We did everything in our power, both to get public sentiment aroused and to get the men in the different localities to bring pressure to bear on their assemblymen and senators, and we have sent our men to all these meetings in favor of good roads, and advocated them. Even while a great many of the wheelmen dropped their interest in good roads and switched off on side paths, the league stood fast on that point. It wanted good roads. A great many have their paths, but the league is still for good roads, and I am satisfied that the league will indorse the action taken yesterday toward abolishing the labor system on the roads; I am equally satisfied that we stand to-day back

of this bond issue. It is a good, clean, logical way of getting roads now. We want roads and we are going to have them. We want them now and we are going to have them now — something that you and I can enjoy — and how are we going to get them, except by this method? How many of us were wealthy enough to give a check for the whole purchase price of the farm or home we own? Most of us were not, and we had to pay for part and mortgage the other part, and enjoy the homes while we were paying for them. We want good roads and we want them now. Our credit is good, and we can build these roads and pay for them while we are using them just as well as we can pay for and build them on the installment plan.

Gentlemen, the League of American Wheelmen will be with you in anything and everything that tends to improve the roads of the State of New York.

W. PIERREPONT WHITE — Mr. Chairman and gentlemen, I am compelled to bring up this resolution. I have listened to the roll call of the counties here in regard to a proposition to bond the State to the extent of \$10,000,000. The resolution as presented leaves me in doubt as to whether that \$10,000,000 of State money, as the resolution is worded, is exactly in the best interest of those present. The resolution for \$10,000,000, as I understand it, simply provides the State's 50 per cent. If that is the case, how are our counties and towns to get their 50 per cent? Wouldn't it be best to follow the lines laid down yesterday and get the State bonds large enough to take care of the counties' 35 per cent and the towns' 15 per cent and give the counties and towns the benefit of the State credit? In order to test the sentiment, I offer the following amendment to Mr. Lyon's resolution:

That the State of New York issue bonds to the amount of \$20,000,000 at 3 per cent interest, 50 per cent of said bonds, or \$10,000,000, being the State share of the cost of road construction, 35 per cent, or \$7,000,000, being the county share of cost of road construction, and 15 per cent, or \$3,000,000, being the town share of the cost of road construction; that said bonds be paid at maturity, 50 per cent by the State, 35 per cent by the counties, and 15 per cent by the towns, and that an assessment per annum be made against the State, county, and towns benefited, to retire said bonds and pay the interest on them during a long period of years; and

that said \$20,000,000 bonds be placed in the hands of the State comptroller, to be sold from time to time as the counties in the State may desire to improve their highways under the Higbie-Armstrong act, being chapter 115 of the laws of 1898, thus providing a constant fund to meet the State, county, and town share of road improvement.

It seems to me this would take care of the whole proposition on the best terms for the State, counties, and towns we represent.

The amendment was accepted by Mr. Lyon and by the convention.

At 11.55 a. m., on motion of Mr. See, the convention adjourned until 2.30 p. m.

VISIT OF THE CONVENTION TO THE GOVERNOR.

Mr. Bond, chairman of the committee appointed to wait on the Governor, asked that the convention in a body call on the Governor, and the delegation proceeded to the executive chamber.

ADDRESS OF MR. JOSEPH B. SEE TO GOVERNOR ODELL.

On the convention arriving at the executive chamber, at Albany, Mr. Joseph B. See, of Westchester County, addressed Governor Odell as follows:

IF IT PLEASE THE GOVERNOR: The members of the Good Roads Convention which are now before you have deputized me to speak for them. Two years ago I occupied a similar position. I stated at that time to Governor Roosevelt that the object of the convention was to secure a large appropriation by the legislature for highway improvement under what is known as the Higbie-Armstrong act of 1898, and asked him to approve whatever the legislature agreed upon.

In responding, the governor assured us that he was with us, and would approve anything reasonable that the legislature might do. He also said that the thing for the members of the convention to do was to show the members of the legislature that their constituents were in favor of large appropriations, and we would get them. Two years have passed, and this large convention, representing every section of the State, even the great city of New York (which pays a large amount of the cost and receives no direct benefit), which sends an influential delegation from the Produce Exchange of that city, shows you, Mr. Governor, as well as the members of the legislature, that the people of this great State are very much interested in the improvement of our highways, and are ready and willing to spend a large sum of money for that purpose. The action taken by the boards of supervisors of the State during the past year in appropriating, in round figures, \$1,000,000, also shows the same thing. I have been a supervisor many years and

I know that supervisors generally follow the people, not lead them. The people of this State want good roads, and woe to any member of the legislature, to any other public officer, or to any party, the representatives of which stand as a barrier against the improvement of our principal highways. Mr. Governor, from your action in relation to the appropriation made last year, we come to you with the greatest confidence, feeling assured that (notwithstanding your well-known views and efforts in favor of economy) you will approve of a large appropriation the present year.

The Good Roads Convention has resolved to ask the legislature to appropriate \$1,000,000. That sum will only provide, on the part of the State, for carrying on the work for which the State engineer and surveyor has drawn plans and prepared specifications, and for which the boards of supervisors have already appropriated an equal sum. Pardon me if I speak for myself and for Westchester County. In that county we have adopted a system for highway improvement which is partly finished. Unless we get one million and a quarter dollars the work will have to stop, and Westchester will be out in the cold. With an appropriation of one million and a quarter dollars you will please every man, woman and child in Westchester county.

Mr. Governor, I feel that you are with us, and that the few words I have spoken are all that is necessary. I thank you for your courtesy and attention.

REPLY OF GOVERNOR ODELL TO MR. SEE.

Replying to the above address of Mr. See, Governor Odell said:

I have a deep interest in the subject of building good roads, and as far as possible it shall be my aim to carry out the wishes of the supervisors' convention, whose members are here with you, and whom I am very glad to meet. It may not be possible for the State to expend as much money in highway improvement as the sanguine friends of the good roads movement may desire, but the result will be a distinct advance in a reform that has been slow in coming, and the progress may be expected to be continuous hereafter until the roads of New York State shall be made creditable to its people.

Last year I found that the appropriation of \$220,000 which the legislature decided upon would only carry the work of road construction down the list as far as Orange County, and I think that under the circumstances I was justified in having the amount increased to \$420,000, which was actually appropriated.

As to the amount to be appropriated this year, this will largely depend upon the other needs of the State. Of course, the legislature must act first, but it is safe to say that I will sign any bill which the legislature may send me.

The amount appropriated may not reach the sum desired by all of the counties, but I hope that it will come as near to it as is possible. I appreciate that good roads are a boon for the farmer seeking to take his produce to market and also for others, who, like myself, may wish to enjoy pleasure riding in greater comfort.

At the conclusion of the above reply each member of the convention was presented personally to the Governor by State Engineer Bond.

WEDNESDAY, JANUARY 29, 1902—AFTERNOON SESSION.

The convention was called to order at 2.30 p. m.

Mr. WILCOX — Mr. Chairman, I would like to ask the different chairmen of the delegations representing the judicial districts to report at this time the names whom they have selected for the executive committee.

The following names were handed to the secretary:

STANDING COMMITTEE OF GOOD ROADS CONVENTION OF 1902.

First district. — John B. Uhle and Albert R. Shattuck, New York city.

Second district. — Col. C. H. Wygant, Newburgh, Orange County; Joseph B. See, Valhalla, Westchester county.

Third district. — E. J. Bedell, Selkirk, Albany county; Henry McNamee, Fly Mountain, Ulster county.

Fourth district. — G. W. Freligh, Niskayuna, Schenectady county; G. H. Whitney, Mechanicville, Saratoga county.

Fifth district. — W. Pierrepont White, Utica, Oneida county (chairman of committee); Frank Z. Wilcox, Syracuse, Onondaga county.

Sixth district. — Joseph H. Brownell, Windsor, Broome county; Charles Chamberlain, Elmira, Chemung county.

Seventh district. — Ira P. Cribb, Canandaigua, Ontario county; W. J. Greenfield, Moravia, Cayuga county.

Eighth district. — James A. Menzies, Buffalo; David Clark, Corfu, Genesee county.

WIDE TIRES.

The CHAIRMAN — The next thing on the programme is the discussion of wide tires by Mr. Frederick M. Power.

FREDERICK M. POWER, of Onondaga County: Mr. Chairman and gentlemen of the convention, at the present time the improved roads of this State have passed the experimental stage, there being a large number of miles finished and in use, and many applications for new sections are coming in.

How can we save the extreme rutting caused by the ordinary tires and gauge of axle? The question can be easily answered: Abandon hauling heavy loads on narrow tires and substitute wide ones, and also where the loads are large in bulk and need the wider wagon bed, simply put in use wide-gauged axles, and

you have solved 75 per cent of the problem of lessening the wear and thereby lessening the expense of maintenance, on the hard, stone-covered road and the city pavement, either asphalt, brick, or stone — this also holds good, as well as on the proper surfaced, graded, dirt highway.

In the years of 1893 and 1894 our work in Onondaga County required the hauling of heavy stone from the quarries to the village of Solvay. The ordinary wagons in use were not strong enough nor wide enough to take on the dimensions of blocks required. Wagons were built as follows: Four-inch tire, 2½-inch axle in front; length of the ordinary gauge, rear wheels, 6-inch tire, 3-inch axle, lengthened out to track evenly outside of the front wheels, poled for two horses and two leaders when desired. The effect of these loads and use on dirt road was very favorable. The track for 12 feet wide was covered with broken stone, and grading and draining were done where needed, the wagons doing the surfacing when going out light. All of this work soon hardened the track to a useful road at all seasons of the year. Stone walls alongside were donated, being broken by hammer in place, and a covering of fine quarry chips completed the surface. Later the carts and wagons used about the works were equipped with similar wide tires. It is now the practice to repair a broken axle by lengthening out and keeping several inches of different lengths on all carts and wagons. New ones recently ordered have 4-inch tires, tracking in rear outside of front. This practice is conclusive to us of the value of such wheels and gauges to all roads.

In the country many are the objections made by the farmers and teamsters, which are not founded altogether on experience with, and use of, wide tires. The idea has, however, slowly won its way, and many are changing. I suggest legislative action for laws to enact a graded system of wide tires suitable for the loads to be carried, and giving a rebate to users of such wagons from the road tax, and to teamsters not land owners a limited time for stopping rebate and allowing such work to commence three or five years hence. This will give wagon makers an opportunity to construct and make the change. The rebates

will repay the cost of changing or repairing, and the lessening of wear will be in favor of granting such favorable terms. The State paying one-half for the work on prominent roads, has a prior right to take a leading hand in this direction; the counties should follow, and the rest of the way ought to be comparatively easy. The western-bound emigrant wagon of Pennsylvania, when the western country was new, is still fresh in mind, and is a good example of its usefulness. The roads over which these wagons traveled are yet in good condition. The European countries have this matter under close regulation, and their common and principal thoroughfares are benefited by the use of wide tires. We need no better example than this. Years of trial prove the adage, "The wagon that carries the load should be the saver, and not the destroyer, of the road."

I have a letter from parties who are drawing heavy loads of brick with wide tires, showing heavy saving in cost of drawing which I desire to have read:

SYRACUSE, N. Y., *January 28, 1902.*

DEAR SIR. —I see that you are to read a paper on "wide tires" at the highway convention of supervisors to be held in Albany.

I have had a large experience with wide tires, and want to say for your encouragement and to those interested that we know positively that the wide tire is cheaper than the narrow tire for the user. We have a large brickworks three miles from Syracuse, and are constantly hauling thousands of loads weighing over two tons on those tires. Our expenses for resetting tires has been reduced at least one-half. There does not seem to be the shrinkage of wood under the broad tire that is so common with the narrow tire. The broad tires wear at least twice as long. They also keep the roads in much better condition, as they do not cause ruts and do not cut the road.

We would not go back to the old tires under any circumstances.

And now a word about good roads in general: For twenty-five years we have been drawing heavy loads over a poor road. Within a few years over three-quarters of the road has been paved. On the poor road we never hauled over 1,000 brick at a load, and often only 600 or 700, and only two loads per day in the fall when the roads were bad. Now we are drawing 1,200 to 1,300 at a load, and deliver three loads per day, and the horses are in better condition. The wear and tear is reduced at least 50 to 75 per cent. This is a practical lesson in what good roads and wide tires will do for the whole community if adopted, and I feel like thanking you and all the rest who are working so hard for the good day coming when the United States will have the best roads of any country in the world.

Very truly yours,

CHARLES H. MERRICK.

MR. F. M. POWER,
Solvay, N. Y.

Mr. WILCOX — I move that our standing committee be instructed to draft a suitable resolution, taking up the question of the width of tires and considering the same as applicable to counties that have received State aid or who shall receive State aid hereafter, and that a bill when passed, if passed, shall take effect on January 1, 1904.

The motion was adopted.

ADDRESS BY MR. ARTHUR H. BATTEY, EDITOR "TRI-WEEKLY TRIBUNE."

THE PRESS AND GOOD ROADS.

The CHAIRMAN — One of the most effective agencies upon which we must depend is the press of the State. Most of us are familiar with the work that the Tri-Weekly Tribune has been doing in the good roads movement. We have with us to-day Mr. Arthur H. Battey, the editor of the Tri-Weekly Tribune, who will now address the convention.

ARTHUR H. BATTEY, of New York — Mr. Chairman and gentlemen, it is hardly within the province of a New York newspaper man to come to your convention and attempt to give you any pointers or instruction as to the construction or maintenance of highways, but as the looker-on sometimes sees points in a checker game which are overlooked by the players, it may be that there are points connected with the business as a whole which have forced themselves more plainly upon my notice than upon yours. That the highways and byways of New York State need a lot of attention, a lot of construction, and a lot of money, no one who has examined the subject even slightly will deny; and it is also undeniable that both the defects in the highways and the means of remedying them have not received that attention at the hands of the press to which they are entitled by their importance to the welfare of the community. A large part of this neglect has been due, until quite recently, to the fact that not many men are sufficiently well acquainted with the subject to talk on it intelligently,

and that those who were so equipped generally "turned down" newspaper men who sought information. They seemed to "fight shy" of the subject, to dodge the issue, or to try to get away from it — anything except come right out in the open and talk plainly. This was and is entirely wrong. It is unjust to the newspaper man, and perhaps unconsciously, but none the less effectively, brings about injustice to the road officials. A man who has left his mark — and it is a good one — on the highways of western Massachusetts was in the Tribune office not long ago, and in introducing him to the chief I spoke of him as being one of the best known highwaymen of his State. Back came the reply: "Not so very long ago the term highwayman was one of obloquy, but now it is becoming an honorable title." This is as it should be. To call a man a good highwayman would be paying him a compliment, and I am glad to see that this convention has been attended by so many men whom I know to be good highwaymen.

It is, I think, in no small measure due to the efforts which have been made through the Tri-Weekly Tribune, that the men who are held responsible for the roads are beginning to see the light. I attended a meeting of the Massachusetts Highway Association in Boston recently, and was surprised to find that no notice of the meeting had been sent to the newspapers, and that no reporter was present to let the public know what was going on. They know better now, but similar instances have occurred elsewhere. And right here lies the explanation of what so many officials who have honestly and faithfully tried to improve the highways have met when the question of an appropriation has come up before the legislature. Protests, growls about extravagance, charges of incompetency or carelessness, or worse, and a final scaling down of estimates, until the money voted was practically wasted because not enough was provided to be of any use. The officials had not taken the newspaper men into their confidence, the public knew little or nothing of what was being done, and queries as to what was being done with the road money were plentiful and pertinent.

The point that it is the duty of the press to aid any work

or measure tending to the public benefit seems to have been ignored or utterly lost sight of. But that is just what the press is for, and is what it is doing, and what it will do more fully and freely as soon as those interested see fit to give it a chance. Those two lines by Robbie Burns,

If there's a hole in a' your coats, I rede ye tent it;
A chiel's amang ye takin' notes, and, faith, he'll prent it,

are true to-day as ever, and I earnestly hope that when the press is thoroughly waked up it will find few holes in the coats of the supervisors of New York. Speaking for my own part in the work, I may say plainly that no criticisms unfavorable to a State, city, county, or town official has been or will be made save in a spirit of kindness, with a view of correcting a mistake rather than a chronic fault-finding, and with a view of ultimately making the roads, big and little, of the greatest State in the greatest nation on earth, superior to those anywhere else on earth.

It can be done, gentlemen, and the press can and will help you do it. There is no good reason why they should not be, and the only excuse of their being in the condition they are in is lack of widespread, popular understanding of the importance of the problem and the benefit which will accrue from expedient and business-like solution. Rest assured that the era of road construction along scientific lines in the Empire State has only just begun. The State which, through the Erie Canal, gave to New York city a commercial pre-eminence which the combined ports of the Atlantic coast have not been able to assail, can make its own internal commerce of corresponding proportions, do away with the isolation and loneliness of life on the farm, bring its country folks, young and old, into close and beneficial touch with the life of the town and city, save time, trouble, money, and health for all its people by proper handling of the road question; and what is more to the point, the State, which can do all these things, will do them, for the press is after them, and what the press goes after good and hard it generally gets. You, gentlemen, and your

successors can be at the head and front and finishing of this movement if you so will it. Show that you are in earnest; show that you mean business; when you have anything to say, say it; and when you haven't, dig up something to talk about, and above all don't be afraid of the reporter. He won't bite. I have eaten, drunk, and slept with him, summered and wintered with him, and when you treat him right you will find that he is a good fellow to be friends with and one who will do the right thing whenever he gets a chance.

Announcement has been made by Senator Cocks, of Nassau County, that he wants to know about the present system of road construction, and whether or not it would be well to connect the present disconnected patches and pieces of improved highways, and incidentally mentioned the possibility of a trunk road across the State through the southern tier of counties, with another one through the center of the State to Buffalo. There are lots of people besides Senator Cocks who want to know, and as for the road through the southern tier, the Tri-Weekly Tribune has prepared a map covering the routes, and is prepared to take it up and work for it in earnest, and with a hope of bringing about its accomplishment. It seems like a big undertaking, but really, is there any undertaking which, when it once commends itself to the sound common sense or the business instinct of the average New Yorker, is too big for the New Yorker to tackle and accomplish? I don't know of any, and I am not willing to think that you do. It was an enormous undertaking to build "Clinton's ditch" from the lake to tide water, and New York was not so well equipped then with men or money as she is to-day; but she did it, and although millions on millions have been poured into that ditch since then, it would take a better man at figures than I am to tell how many millions that have come to the State through that same ditch. The great Erie Canal is a monument to the wisdom and foresight of our fathers. Let us go a step onward and leave to our sons a lasting monument in the shape of a road system which will be unmatched anywhere for utility

and duty, and of so much importance to the citizens of our State that there will always be a rivalry between the State and the counties as to which can do the most to improve it.

In all this work you will find the press a careful, consistent, helpful guide, counselor, and friend — by this I mean the great body of reputable newspapers throughout the State. If you falter or make a misstep they will tell you so plainly, and at the same time try to straighten things out so long as you mean well. If you persist in wrongdoing after the right has been shown you, you will find them merciless; and no public officer has so high a position or is so fixed in tenure that he may escape censure and condemnation. There is no threat in this, gentlemen; it is simply cold fact, and there are many men in this great State of ours who know how cold and hard a fact it is.

I have come to you, gentlemen, with a message of good will. Speaking for the good-roads department of a newspaper which will never be forgotten while the nation lives, I offer you cordial and hearty support in all of your work which makes for the public welfare, and would ask your careful consideration of the wish, hope, and request, that we may work side by side in harmony and as allies. Our side is ready, and the question is up to you.

WILLIAM PIERSON JUDSON, of Oswego, Deputy State Engineer of New York — I have in my hand two papers prepared by gentlemen prominent in the good-roads movement in the United States, and whom State Engineer Bond had hoped would be present in person. If I were addressing a meeting of the civil engineers of the United States it would not be necessary for me to do more than mention the names of the authors of the papers. The one, entitled "Relation between macadam roads and electric street railways," is by Edward P. North, M. Am. Soc. C. E., who had charge of the roads and pavements of New York city, and who is the author of one of the best known textbooks on "Roadmaking and Maintenance," which is among

the valued books of every student of road-building, and which has been studied with profit by engineers everywhere.

The other paper, entitled "The relation of common roads to railroads," is by Prof. Lewis M. Haupt, M. Am. Soc. C. E., and member of the Isthmian Canal Commission, who would have been with us to-day but for an important meeting of the commission, which made it impossible. The convention is fortunate that the personal relations of State Engineer Bond and myself with these gentlemen are such that, notwithstanding the important duties which occupy them, they have taken the time to specially prepare these valuable papers, which you will hear with profit and which will form, with the similar papers read yesterday, prominent features of the published proceedings of this convention.

RELATION BETWEEN MACADAM ROADS AND ELECTRIC STREET RAILWAYS.

By EDWARD P. NORTH, M. Am. Soc. C. E.
Of New York.

No one can look at the returns of the last census without concern for the future of our rural districts, and consequently on the future of this State. The rewards offered to ambition in twenty-two counties in this State have in the past ten years grown relatively, if not absolutely, less, and they are being depopulated. The list of those counties, with their population in 1900 and the loss since 1890, is given as follows:

| Counties. | Popula-
tion in
1900. | Loss
since
1890. | Counties. | Popula-
tion in
1900. | Loss
since
1890. |
|-----------------|-----------------------------|------------------------|-----------------|-----------------------------|------------------------|
| Allegany..... | 41,510 | 1,739 | Putnam..... | 13,787 | 1,062 |
| Chenango..... | 36,568 | 1,208 | Rensselaer..... | 121,697 | 2,814 |
| Columbia..... | 43,211 | 2,061 | Schoharie..... | 26,854 | 2,310 |
| Cortland..... | 27,576 | 1,081 | Schuyler..... | 15,811 | 900 |
| Essex..... | 30,707 | 2,345 | Seneca..... | 28,114 | 113 |
| Greene..... | 31,478 | 120 | Tioga..... | 27,951 | 1,984 |
| Lewis..... | 27,427 | 2,379 | Washington..... | 45,624 | 66 |
| Livingston..... | 37,059 | 742 | Wayne..... | 48,660 | 1,069 |
| Madison..... | 40,545 | 2,347 | Wyoming..... | 30,413 | 780 |
| Orleans..... | 30,164 | 1,639 | Yates..... | 20,318 | 683 |
| Oswego..... | 70,881 | 1,002 | | | |
| Otsego..... | 48,939 | 1,922 | Total..... | 845,294 | 30,266 |

That is to say: In the 22 counties mentioned there has been a decrease in population of over 3½ per cent during the past ten years. In this period the State as a whole has gained 1,270,159, a gain of 21.2 per cent, but the gain in cities of 25,000 inhabitants or more has been 1,268,769, so that the gain in our population has been almost entirely made in cities.

In the city of New York, comparing equal areas, the increase between 1890 and 1900 has been from 3,437,202 to 4,507,414, or 1,070,212, which nearly accounts for the net urban gain, some cities of 25,000 and over having lost population.

It will be noticed that of the five counties on the east side of the Hudson from Putnam to Washington, inclusive, all but Dutchess have lost population. The increase in that county, 3,791, is offset by a gain in the population of Poughkeepsie of 3,859. The net loss to the five counties is 3,065 inhabitants.

Comparing our condition with the whole country and neighboring States, find:

| States. | Population
in 1900. | Ten years
increase. | Pro rating
of increase. |
|--------------------|------------------------|------------------------|----------------------------|
| United States..... | 76,303,387 | 12,937,008 | 20.7 |
| Connecticut..... | 908,420 | 162,162 | 21.7 |
| Massachusetts..... | 2,805,346 | 566,403 | 25.3 |
| New Jersey..... | 1,883,669 | 438,736 | 30.4 |
| New York..... | 7,268,894 | 1,270,159 | 21.2 |

The comparison shows that among the States only Nevada has lost population. In Connecticut there has been a loss in Tolland county, which lies east of Hartford, of 558. In Massachusetts there has been a loss in two counties —

Barnstable, 1,346, and Nantucket, 262; the first of these is east of Buzzards Bay, including Cape Cod, the other is an island. There has also been a loss in two counties of New Jersey — Burlington, 287, which lies south of Trenton and east of Camden, and Hunterdon, 848, which lies southeasterly from Phillipsburg.

A more intimate knowledge than I possess is requisite for an ex-cathedra statement as to the causes that have reduced the rewards of enterprise and made a decrease in the attractiveness of the above-mentioned twenty-seven counties as a place of residence, and there is a promptly acknowledged inability to prescribe a certain specific for the difficulty. But it is competent, and seems highly desirable, to call the attention of this body to the facts enumerated, and ask a serious study by individual members to be followed at a later meeting by a classification of the facts found which relate to and govern this extremely unsatisfactory movement in our population.

As there is difficulty in arranging any series of facts, or even in looking for them without the aid of some theory, even if it is to be promptly discarded, it is suggested that the inquiry should be commenced on the supposition that lack of convenient and cheap transportation may be the governing factor in these changes of population.

There can be little doubt in any mind that cheap and rapid transportation, affording convenient access to large markets, controls the position of large industries; or, in other words, these will be located where the cost of assembling the raw materials for manufacture and distributing the finished products is the smallest. The high cost of wagon transportation over unimproved roads now precludes profitable manufacturing at the site of the numerous small powers once used, and it is doubtful if they will ever again be employed as they were fifty years ago, diversifying the industries of the country districts and making first-class mechanics of nearly all farmers' boys.

The occupation of the country by farmers and by those who are not obliged to be in some town every day, with those suburbanites who are known as commuters, stands on a different and more hopeful basis. Farming is an occupation that is generally pursued for gain rather than for the sake of unremunerated labor. But the farmer is confronted with the fact that while all cost of transportation must in some ratio be divided between the producer and consumer, he generally sells in a nearly satisfied, if not glutted market, where the cost of transportation falls on him, so that he in general is the heaviest loser by roads over which the cost of haulage is excessive.

When his day's work is done he joins his wife and children in the leisure class, and becomes, like the commuter, dependent on the ease with which he can reach the various centers of interest near him; and good macadam roads have already proved their value in keeping the farmer's family contented in their home, as well as increasing the net rewards of their labor.

The choice of residence by commuters is governed by mixed considerations of time, cost and attractiveness of locality, and good roads are a weighty factor in the attractiveness of a locality. It is probably because New Jersey commenced building macadamized roads about thirty years ago that the State is able to show a thirty per cent increase in her population, while the five counties east of the Hudson and north of Westchester, without improved roads, show a net loss of slightly more than one per cent. This, however, is not entirely due to the absence of improved roads; it is claimed that the railroads extending north and south

through these counties take less pains to develop their commuting traffic than do the roads through either New Jersey or Connecticut.

Some theories of this kind seem necessary in accounting for decreased population in a beautiful and healthy country near to and closely connected with the largest and richest city on this continent, whose business men are filling up the near-by counties of New Jersey and Connecticut.

If we assume that the average wealth of inhabitants of this State is equal to that of the average inhabitant of the whole country, as stated by the Treasury Bureau of Statistics, namely, \$1,235.86 per capita, the withdrawal of 30,266 persons from country homes in this State implies a loss of over \$4,000,000 to the localities from which they moved.

Judging from a limited experience, it may be safe to say that a good road will attract both residents and business. These make the road attractive to trolley companies, and a trolley road, obviating the necessity of getting out either a horse or wheel, makes the locality still more attractive to residents and business.

It is well known that in many parts of Europe the inhabitants congregate in small villages, walking miles to their farms, and it is probable that under the improved ease of circulation presented by trolley cars the population of the country will concentrate on roads occupied by them. When any such development occurs the trolleys will be double tracked, and the value of a road of ordinary width for traffic by wagons, etc., will be greatly impaired, if not destroyed, as the wagon traffic is becoming more dense and more important to the locality.

On Fifth avenue, in the city of New York, the traffic has outgrown the capacity of the wheel way, and it must be widened at a great cost. In London the widening of Cheapside and Newgate streets was completed about ten years ago, and it is claimed that the operation must be repeated on Cheapside, as that thoroughfare is again overcrowded. These widenings have been accomplished at what was held to be prohibitory cost, on account of the destruction of the buildings fronting on them. Like widenings will undoubtedly be necessary on most of the roads that are to be macadamized in this State, and they should be completed before improvements add materially to their cost.

The feeling of antagonism to trolley roads, which destroy a newly made macadam and permanently impair the usefulness of the road for wagons, automobiles, and wheels, should not make us forget their great value in distributing population.

At the same time, the companies exploiting them should be required to join the local authorities in widening all roads used by them. In some parts of Massachusetts the entire cost of widening roads has been thrown on the trolley company. This may not be entirely just. The question, however, should receive the study of this convention, both now and hereafter; for such a distribution of the cost as shall not impede trolley building to the loss of the country inhabitants and real estate values, and at the same time be just to the property owners, cannot be made without consideration.

THE RELATION OF COMMON ROADS TO RAILROADS.

By LEWIS M. HAUPT, M. Am. Soc. C. E.,

Consulting Engineer, of Philadelphia, Pa.

The value of a property is largely dependent on its accessibility and earning capacity. If a producer is obliged to pay out all of his profits to reach the market, his labor is in vain and his property unprofitable and unsalable. If, however, there is more than a sufficient margin between cost and market price to pay for transportation and other expenses, then his property becomes valuable, and the larger this margin is the more valuable does the property become.

The question, therefore, is one of practical importance as to the best way of reducing the cost of reaching the market and thus increasing the profits.

As railroads cannot be built to each farm, but must follow the lines of least resistance and greatest resources, and as they are operated by corporations which have the power to regulate the rates within certain limits on different classes of freight, and to change the classification at pleasure on giving notice, it is evident that a large part of the cost of the movement is beyond the control of the individual. The rail charge constitutes but a portion of the total cost, however, and it may be possible to effect economies in other links of the chain which will extend the market range without increasing the ultimate cost.

Nearly all commodities are subject to a longer or shorter haul by wagon at both ends of the route before reaching the consumer, and from the statistics collated by the United States Office of Public Road Inquiries it appears that the average cost of hauling on an earth road is many times greater than on a railroad and still greater than on a waterway. As these three systems frequently enter into the path of the commodity on its way to market, they all constitute mutually dependent elements of a system, and correspondingly affect the cost. Their relative values may best be determined by stating the average cost for transportation over each link; thus, on an earth road the stated charge is 25 cents per ton-mile; on the railroad it is about three-fourths of a cent, and on water it varies from one-fourth to one-twentieth, according to vessel and channel. The relation of these charges may be more clearly stated by comparison with the lowest water rates taken as a unit. Thus, a wagon road would be 500 times more expensive, a railroad fifteen times more, and a canal five times more than the ocean rate, which means that the commodity can only be carried a correspondingly shorter distance before its margin is absorbed by the cost of its movement; or in other words, a product that could be carried only one mile on an earth road could be hauled thirty-three miles on the railroad or 500 miles on the ocean for the same charge. The latter medium is, therefore, the natural highway of commerce, and the sooner a commodity can be made to reach a waterway the greater will be the economy and the farther its range for a given cost.

But the expenses of movement on a highway are composed of many items and affected by variable conditions, as the grades, distances, soils, drainage and surface of road, all of which pertain to the way, and are subject to the engineer or supervisor; but there are others, as the width of tire, length of axles, number of wheels and other factors, which also affect the movement.]

The effect of grades and the character of the surface may be best expressed in figures in the form of tables (appended), from which it appears that an earth road offers twenty times more resistance than an iron tramway, thirteen times more

than asphalt, ten times more than a plank road, and twice as much as a macadam road. This is independent of everything but the surface metalling. By reducing the grades, shortening the distances, improving the surface and the drainage, and removing the points of greatest resistance there are many roads on which the cost could readily be reduced to less than one-half of the present charge, and the capacity of the horse be largely increased without extra effort.

The following table shows the force necessary to move a load of 6 tons on a macadamized road at a speed of 3 miles an hour:

Resistance of grades.

| Grade. | Force in pounds. | Equivalent length of level road. |
|----------------------|------------------|----------------------------------|
| Rising 1 in 600..... | 286 | 1.075 |
| Rising 1 in 300..... | 309 | 1.108 |
| Rising 1 in 200..... | 331 | 1.255 |
| Rising 1 in 100..... | 398 | 1.510 |
| Rising 1 in 50..... | 533 | 2.019 |
| Rising 1 in 25..... | 712 | 2.699 |
| Rising 1 in 10..... | 1,600 | 6.068 |

The following table shows the force required to draw one ton on a level on different materials:

Resistance of surfaces.

| Surface. | Pounds. | Surface. | Pounds. |
|----------------------------------|---------|----------------------------------|---------|
| On an iron tramroad..... | 10 | On poor stone-block surface..... | 50 |
| On an asphalt surface..... | 15 | On cobblestone surface..... | 90 |
| On a wooden surface..... | 21 | On macadam surface..... | 100 |
| On best stone-block surface..... | 23 | On earth road..... | 200 |

By reducing the resistance to haulage on a common road even to one-half, the tributary territory may be doubled and the tonnage correspondingly increased, so that it would seem to be the cheapest method of increasing the short-haul tonnage of the railroads if those corporations would assist in the improvement of the highways, either directly or by encouraging localities to do so, by making specially low rates on stone or other materials used in road construction.

It is a well recognized fact that the distance which a commodity may be carried is a function of its value, and that no freight of low value can bear a long overland haul. Thus, there are few forest products which have sufficient margin to permit of rail transportation for more than a few hundred miles, as their average value is about eleven dollars per ton; so they are sent by water wherever practicable, and it is found that about seventy-five per cent of the low-priced articles move by water while the great bulk of the rail freights are composed of high-priced merchandise which has an ample margin for long hauls, the average value being over \$300 per ton.

It would seem to be to the interest of all parties, therefore, to reduce the cost of transportation, while maintaining stable prices by reducing the resistances between the producer and consumer as rapidly as possible by a systematic improvement of the highways of the State, for they are now the greatest obstacles to interstate commerce and the most expensive point in the line of communications.

FINAL PROCEEDINGS.

The resolution offered by Mr. Conboy, in regard to assembly bill No. 213 was reported favorably by the committee on legislation, and the resolution by Mr. Donnafield for keeping the highways free from snow during the winter months was reported adversely by the committee on resolutions.

Votes of thanks were extended to the chairman and secretary, to Mr. Edward A. Bond, to Mr. D. E. Pugh, and to the gentlemen who prepared and read papers, after which the convention adjourned sine die.

Report of Special Examiner of Highways.

STATE OF NEW YORK:

OFFICE OF THE STATE ENGINEER AND SURVEYOR,

ALBANY, October 1, 1902.

HON. EDWARD A. BOND, *State Engineer and Surveyor, Albany, N. Y.:*

MY DEAR SIR.— I beg leave to report that during the summer and fall of the year 1902 I have filed 54 reports, covering 161½ miles of unimproved highways, for which petitions from various counties of the State have been received asking for improvement under the provisions of the Higbie-Armstrong Act.

These reports cover the question as to the availability of material for road construction, the amount of traffic, material forming the surface of traveled road, and such other information as the location and general conditions seem to require, and more particularly as to whether public interest demands that the improvement shall be made and as to whether the State should incur the expense of making the preliminary surveys.

In many instances I have procured signatures of property-owners adjoining the highways to be improved to agreements where they promised to furnish, at an agreed price, materials on their lands or the delivery of the same by them, rights-of-way on lands owned or occupied by them, use of lands for storage of material, and the placing of machinery, the rights to obtain water, quarry rights, and such other concessions as might be necessary.

This places in the hands of your department reliable data on which to base preliminary estimates of cost, and it is also provided that this agreement may be turned over to the contractors by you for their protection in the carrying out of their contracts.

In eighteen counties of the State I have visited the boards of supervisors while in session, and a general discussion of the laws relating to the improvement of public highways has been had, and as a result petitions for the improvement of 225.80 miles of highways have subsequently been placed on file.

Upon the request of the Director of the Bureau of Farmers' Institutes of the Department of Agriculture of the State, I have attended meetings of Farmers' Institutes and have furnished such information as has seemed to be required.

Up to September 30, 1902, the cost of crushed stone on switches, on the line of the Delaware and Hudson Company at various points within one county, was \$1.50 to \$1.65 per cubic yard. I am pleased to inform you that the quarrymen, recognizing the growing demand for broken stone product, have made a marked reduction in price, and the Delaware and Hudson Company has also made marked concessions in freight rates, so that broken stone can now be had at these points for from \$1 to \$1.15 per cubic yard, showing a reduction in price of material delivered on cars, on switch, at various distributing points of fifty cents per cubic yard.

This one county above mentioned has now on file in your office petitions for $31\frac{1}{2}$ miles of stone roads under the Higbie-Armstrong act, at points reached by the lines of the Delaware and Hudson Company, calling for 40,950 cubic yards of stone product, which, at a reduced cost of fifty cents per cubic yard, makes a net saving to the State, county and towns in this one county of \$20,475.

Therefore, at the same ratio, taking the unimproved roads petitioned for on the entire line of the Delaware and Hudson Company of over 160 miles, calling for 208,000 tons of broken stone product, other than local material, would make a net saving to the State, counties and towns on the lines of this railroad of \$104,000.

I am also pleased to call your attention to a similar reduction in the cost of material on the Lehigh Valley Railroad.

Owing to the results obtained in this direction, I would suggest that the other producers of materials, and also the transportation companies, be importuned to make similar concessions.

All of which is respectfully submitted.

FRANK D. LYON,
Special Examiner of Highways.

REPORT OF CEMENT TESTS.

CEMENT TESTING LABORATORY — STATE HALL,

ALBANY, N. Y., October 1, 1902.

Hon. EDWARD A. BOND, *State Engineer and Surveyor*:

SIR.— I have the honor to submit the following report of the work of the cement testing laboratory of your Department for the fiscal year ending September 30, 1902:

This work has been principally routine work, although some special tests have also been made. The requirements are given on page 198 of this volume.

There have been submitted to this Department during this past year 263 lots, consisting of a total of 2,831 samples. These have been given a total of 5,880 tests for tensile strength. With the exception of 44 tests, which were made of neat cement, the briquettes were made up in the proper proportions of cement and standard crushed quartz sand, according as the cements were Portland or natural cements. The number of tests made show an increase of 7 per cent. over the work of 1901 and of 85 per cent. over 1900. This increase is due largely to the greater use of concrete upon State works.

The work done includes a large number of tests made for the State Architect and for municipal work. For the State Architect 59 lots of a total of 821 samples have been given 1,642 tests for tensile strength. As compared with last year, these figures show an increase of 50 per cent.

Each lot of samples submitted were, in addition to the tests for tensile strength, given tests for fineness of grinding and for initial and hard set.

The number of hot water tests made is much larger than the number made in previous years and the practice now is to make the test for each lot of samples received.

The number of failures to meet the requirements of the Department is much larger than for several years past. The results show the following failures:

Of the samples of Portland cement submitted, 8 lots with a

total of 112 samples were low in tensile strength in both the 7 and 28 day tests; 5 lots, with a total of 110 samples, were low in tensile strength in the 7-day tests, but gained enough so as to pass in the 28-day tests; 11 lots, with a total of 113 samples, passed the requirements for tensile strength in the 7-day tests, but failed in the 28-day tests; 3 lots, with a total of 80 samples, failed in the hot water test, and 5 lots, with a total of 57 samples, set too quickly. Two lots of Silica Portland cement, with a total of 13 samples, passed all the tests except that they failed in tensile strength in the 28-day test.

Of the samples of natural cement submitted, 1 lot of 10 samples failed in tensile strength in both the 7 and 28 day tests; 2 lots, with a total of 20 samples, were low in the 7-day test, but passed in the 28-day test; 6 lots, with a total of 68 samples, failed in the hot water test; and 2 lots, with a total of 12 samples, set too quickly.

One sample of cement which was called a "high-grade Portland," and upon the testing of which depended a large order, showed a very poor grade of "slag" cement—the results in tensile strength being very low in both 7 and 28 day tests.

The number of brands represented by the samples received remains about the same as last year, although several brands new to this laboratory were among those received. The brands tested were: 24 American Portland, 1 American Silica Portland, 9 American natural, and 1 American Puzzolan (or slag) cements.

Eighty-two per cent. of the cement tested was Portland cement and 18 per cent. was natural cement. Practically all of the natural cement was used in the Department of the State Architect.

In February, 1901, some concrete blocks were made and put outside to freeze. These blocks were 6-inch cubes, and were made up of concrete mixed in the proportion of 1 part Portland cement, $2\frac{1}{2}$ parts natural sand, and 5 parts broken stone. The following were the percentages of salt solution used in mixing up each set of blocks: None, 10, 20, 30, 40, 50 and 60. Two

blocks were made in each set, and as soon as moulded were put outside in the freezing weather. One other set was also made. This latter was made up of heated water and sand, and was mixed up and put in the moulds out in a temperature of 18° F. The water was at 175° F. and the sands at 200° F. when used. All of these blocks have been left outdoors and exposed to the prevailing weathers. No signs of disintegration are apparent in any of them as yet, the corners and edges remaining sharp and hard.

At the end of two years, in February, 1903, it is intended to have these blocks broken.

A brief description of the method used in making the tests in this laboratory will probably make the results of the tests much better understood as well as more easily comparable with the results obtained in other testing laboratories. The method is as follows:

Sampling. After the cement, proposed to be used upon any contract work of the State, has been delivered and well-stored, the engineer in charge, or his representative, takes one sample from every tenth barrel of cement or from the equivalent of the tenth barrel when packed in sacks. Each sample fills a three-inch cubical tin box; and each is properly marked with its number, the brand of the cement, the work upon which it is to be used, and the date of sampling. The tin boxes are then packed in wooden cases made expressly for the purpose and each capable of holding ten tin boxes. These cases are then sent by express to this laboratory.

Upon receipt here a portion of every sample is taken and these portions are thoroughly mixed into a large general sample. From this mixed sample is taken the cement used in making the tests for fineness, setting qualities, and soundness.

Fineness. The tests for fineness consist of weighing on a scale capable of weighing to one ten-thousandth part of a pound a certain amount of the cement. This is carefully sieved through standard sieves of 2,500 and 10,000 meshes to the square inch. The sieving is done simply by shaking the sieves by hand. The residue is weighed and the percentages thus obtained. Ninety-five per cent of the cement must pass the 2,500 mesh sieve and 90 per cent must pass the 10,000 mesh sieve.

Neat pats. From the mixed sample enough is also taken to make three pats. This is mixed up into a stiff paste by adding from 20 to 25 per cent by weight of water to Portland cements and from 30 to 33 per cent to natural cements. After being thoroughly trowelled this paste is

moulded into three pats on glass plates about three inches by four inches in size. These pats are about one-half inch thick in the center and are drawn out to thin edges.

Setting qualities. As soon as made, the neat pats are placed in a moist-air cabinet and allowed to take their set. One pat is examined from time to time, and when it will hold the one-twelfth-inch wire loaded to one-quarter pound and the one-twenty-fourth-inch wire loaded to one pound without an appreciable indentation the initial and hard sets are respectively noted. To be accepted, Portland cements must not take an initial set in less than 25 minutes, or natural cements in less than 15 minutes. The time is estimated from the moment of adding the water to the cement.

Soundness. When the pats are fully hardened, one is kept in the steam of water at 125 degrees Fahr. for an hour and is then put into the hot water. This is the "hot water test"; and if the pat, after remaining for 24 hours in water maintained at 125 degrees Fahr., shows no sign of blowing or cracking, it is reported as "Good." The other pats are given normal air and water tests by being kept respectively in air and water maintained at from 60 to 70 degrees Fahr.

Tensile strength. Mortar. For the tests for tensile strength, each sample is gauged separately with its proper proportion of standard crushed quartz sand—1 part of Portland cement to 3 parts of sand, or equal parts of natural cement and sand, parts by weight. As each sample is thus gauged it is put into a small pan and each is kept in the order of its number so that the samples will not lose their identity. Each separate sample of cement and sand is thoroughly mixed dry and then from 10 to 12½ per cent by weight of water is added to Portland cements and from 16 to 17½ per cent by weight to natural cements. The percentage used is such as will give a stiff mortar which will show up water when the trowel is drawn heavily over it. This mortar is thoroughly trowelled and is then put into the moulds.

Briquettes. The mould, which is of brass and of the standard form adopted by the American Society Civil Engineers, is first filled with loose mortar and this is carefully compacted by pressing down with the thumbs protected by rubber gloves. More loose mortar is placed in the mould and is pressed down as before. This makes about three-quarters inch of mortar in the mould, having been placed in about three-eighths-inch layers. The top layer is placed by striking a further addition of loose mortar with the back of the trowel. The briquette is then struck-off even with the top of the mould. Two briquettes are made from each sample.

Treatment. As soon as made, the briquettes are placed upon plates of glass and are placed in the moist-air cabinet, care being taken to keep them in their order so as to still retain their identity. After the mortar has hardened, the briquettes are removed from the moulds and replaced

in the cabinet. Twenty-four hours after gauging, they are marked with a number which is given to each briquette consecutively as each is made and are immersed and kept in water maintained at a temperature of about 60 to 70 degrees Fahr.

Breaking. On the seventh day after gauging, the first test for tensile strength is given, and 21 days later, or on the twenty-eighth day after gauging, the second briquette of each sample is broken for tensile strength. A new Fairbanks cement testing machine with all the latest improvements is used to obtain these results.

All the operations are conducted by myself alone, so that there is perfect uniformity in the treatment of all the samples.

Strength. Portland cements, mixed as described, must show an average of at least 125 pounds per square inch in tensile strength in 7 days and an average of at least 220 pounds per square inch in 28 days. Natural cements, mixed as described, must show a tensile strength of an average of at least 65 pounds per square inch in 7 days and an average of at least 150 pounds per square inch in 28 days.

Neat briquettes. Tests for tensile strength of neat briquettes are seldom made, as the practice of this department is to place the greater dependence upon the mortar tests. Whenever they are made, however, they are made and treated in a manner similar to that given mortar briquettes; excepting, of course, that a greater percentage of water is used — usually being about one per cent less than that used in gauging for the neat pats of that particular lot or brand. Neat briquettes of Portland cement, so made, must show an average of at least 400 pounds per square inch in tensile strength. Neat briquettes of natural cement, made as are mortar briquettes, and kept in moist air two hours and then immersed in water for 22 hours must show an average of at least 60 pounds per square inch in tensile strength.

Acceptance. All results obtained at the end of the seven-day tests are submitted to Mr. William Pierson Judson, Deputy State Engineer, and the lots are accepted or rejected by him according as the results show that the cement passes or fails in the tests.

Very respectfully,

RUSSELL S. GREENMAN,

Engineer in charge of cement tests.

Report of Charles Wyeth, Surveyor of Oyster Lands
under the State Engineer and Surveyor
of the State of New York.

TO EDWARD A. BOND, *State Engineer and Surveyor of the State of New York.*

December 1, 1902.

SIR.—I have the honor to present the following report of my work, surveying and mapping lands under water of the State of New York for shellfish culture, and preparing the necessary papers connected therewith for the fiscal year ending October 1, 1902.

My work of the past year under your Department and direction of Superintendent of Shell-fisheries, Hon. B. Frank Wood, has been in continuation and pursuance of the oyster surveys initiated by the Hon. Eugene Blackford in 1887, and carried forward by each successive commissioner to the present time.

During the fiscal year, October 1, 1901, to October 1, 1902, there were 121 applications received for grounds for the cultivation of oysters, and to the present date, December 1, 1902, inclusive, 125 applications were received. Of these applications eight were withdrawn, some of them covering ground already applied for. Of the balance (117) 114 have been leased to the applicants or highest bidders, and three are now being advertised. Under the applications granted, including the three now being advertised, there are 1,372.40 acres.

This brings the acreage of leased ground to date, December 1, 1902, to 7,247. There were no franchises granted in the past year for the cultivation of oysters. But there are now held under franchise granted in previous years 20,005 acres, which, added to that leased, brings the total to 27,252 acres now under cultivation.

The applications received during the past fiscal year were for oyster grounds under the waters of Raritan Bay, Pelham

or East Chester Bay, Jamaica Bay and Long Island Sound, but principally in Pelham or East Chester Bay and Jamaica Bay.

I have surveyed during the last fiscal year fifty-five plots of oyster ground, located in Raritan Bay, Long Island Sound and Jamaica Bay, covering all but two of the applications received, with exception of those covering grounds in East Chester or Pelham Bay, of which we have no triangulation survey and for which I would respectfully suggest that provision be made in the appropriation for the coming year.

There are sixty-six applications pending for oyster grounds in Hempstead Harbor and Manhasset Bay now being litigated by the town of North Hempstead. If these bays are finally declared to be in the State jurisdiction it will necessitate triangulation surveys for the location of the grounds. And provision should be made in an appropriation for such work also. To be more explicit, the location and survey of the grounds applied for in Pelham or East Chester Bay and vicinity and Manhasset Bay and Hempstead Harbor will require signals to be built (where natural objects cannot be found) around their shores, and these signals will have to be located by a triangulation survey and then plotted on the maps of the several localities. With these signals we locate each corner of each individual lot.

Respectfully submitted by,

CHARLES WYETH,

Surveyor of Oyster Lands.

Report of the Land Bureau of the State Engineer Department.

ALBANY, N. Y., October, 1, 1902.

HON. EDWARD A. BOND, *State Engineer and Surveyor*:

SIR.—I have the honor to present herewith a report on the various matters pertaining to the Land Bureau of your office for the fiscal year ending September 30, 1902.

During the fiscal year the Commissioners of the Land Office have applications for grants of land under water which are referred to this Department for examination and report, as are also a large number of miscellaneous matters relating to State lands. These matters require careful inspection and naturally consume a great deal of time.

The maps and papers are examined to determine their correctness and proper form, both from an engineering standpoint and to insure their conformity to the rules and regulations of the Land Office.

In some cases it is also necessary to visit and inspect the locations of the proposed grants to decide as to the advisability of making the grants on the lines of the application, or if necessary to have them modified.

It is also at times deemed advisable to deny some of these applications on account of interference with navigation, with the rights of adjoining owners, or the rights of the public.

There have been received during the past year sixty-five applications for grants of land under water, situated in the following counties:

Richmond, 20; Rensselaer, 16; Queens, 7; Westchester, 5; Greene, 5; Otsego, Nassau and Kings, each 2, and one each in Albany, Erie, Rockland, Ulster and Jefferson.

Seven of the applications were for purposes of commerce and the remainder for restricted beneficial enjoyment.

Five applications were contested or had remonstrances filed

against them, and hearings have been necessary to determine the rights of the several interested parties and report the outcome to the Commissioners of the Land Office.

The State Engineer and Surveyor has sold at public auction all of those unappropriated lands of the State which have been ordered to be sold by the Commissioners of the Land Office. Nearly all of the lands sold were acquired through the Comptroller's tax sales.

The records of the office show that there were held during the year 17 public auctions, at which 45 parcels of land were sold. The sum of \$7,046.95 was realized therefrom. The lands sold were in 12 counties, as follows: Kings, 19; Niagara, 10; Richmond, 7; and one each in Allegany, Chautauqua, Jefferson, Montgomery, Oneida, Onondaga, Orange, Oswego and Westchester.

Maps are now being made in this Department for the use of the State Engineer and Surveyor and the Commissioners of the Land Office, which will show the lands under water adjacent to the shores of Orange and Ulster counties which have been granted by the Commissioners. We now have finished maps of the counties of Richmond, Westchester, Kings, Queens, Nassau and Rockland, to be followed by Orange and Ulster; these maps have all been brought up to date and are of great value for reference in adjusting land grants.

There has been the usual amount of correspondence and answering of inquiries from surveyors, lawyers and others on matters pertaining to the original maps and descriptions of the Colonial and early State surveys filed in this office. The answering of such inquiries often requires much time and study, as there are frequently more than one survey of the same land made at different times by various surveyors, and none should be overlooked. These maps become more valuable as time passes, and as a large part of them are very old and describe lines of tracts of land which have become in many instances the boundaries of towns and counties, the value of those records become of still greater value.

For better preserving these records they are now being rearranged, placed in bound volumes and carefully indexed for convenience of reference.

That it is the proper method for the care of these valuable papers, and that it affords greater facility of finding particular papers with the certainty that none have been overlooked, has already been fully demonstrated.

Respectfully,

MERRITT PECKHAM, JR.,

Assistant Engineer in Charge of Land Bureau.

Report of the Bureau of Bridges of the New York
State Engineer Department for the Fiscal
Year Ending September 30, 1902.

ALBANY, September 30, 1902.

HON. EDWARD A. BOND, *State Engineer and Surveyor*:

Dear Sir.—I have the honor as Chief Bridge Designer and Inspector of the Bureau of Bridges of the New York State Engineer Department to report as follows for the fiscal year ending September 30, 1902:

During the year the office force in this bureau has consisted of the Chief Bridge Designer and from two to five assistants.

Superstructure plans with necessary specifications and estimates of cost have been prepared and submitted to the State Engineer and Surveyor for the following described bridges:

Riveted, lattice girder, pontoon, lift-bridge over the Erie Canal at Plymouth avenue, Rochester (chapter 732, Laws of 1901); plank roadway and two plank sidewalks; span, 104.5 feet center to center of end posts; width, 60 feet center to center of railings; contract price, \$43,320.

Plate girder span over the Clark and Skinner Canal at Ohio street, Buffalo (chapter 695, Laws of 1901); brick paved roadway and two Portland cement sidewalks; span, 58.42 feet center to center of bearings; width, 55.5 feet center to center of railings; estimated cost, \$19,300.

Riveted lattice girder span over the Erie Canal at South James street, Rome (chapter 614, Laws of 1902); wood paved roadway and two Portland cement sidewalks; span, 94.5 feet center to center of bearings; width, 55.79 feet center to center of railings; contract price, \$17,445.

Four riveted lattice truss spans over the Allegany River at Onoville on the Allegany Indian Reservation (chapter 467, Laws of 1902); plank roadway and no sidewalks; total length, 508.5 feet; width, 18.58 feet center to center trusses; contract price, \$25,311.50.

Two riveted lattice girder spans over the Otsquago Creek in the village of Fort Plain (chapter 468, Laws of 1902); plank roadway and one plank sidewalk; total length, 151.5 feet; width, 22.67 feet center of girder to center of railing; contract price, \$6,822.50.

Plate girder swing span over the Black Rock Harbor at Ferry street, Buffalo (plans completed) (chapter 696, Laws of 1901); plank roadway and two plank sidewalks; length over all, 132.2 feet; width, 31.1 feet center to center railings; contract price, \$26,860.50.

Standard riveted lattice girder span for use on highway improvement; plank roadway and no sidewalks; span, 36.75 feet center to center bearings; width, 18 feet center to center of girders; estimated cost, \$710.

Riveted lattice girder span over Eighteen-Mile Creek on road from Wilson to Lockport; plank roadway and no sidewalks; span, 64 feet center to center of bearings; width, 15 feet center to center of trusses; estimated cost, \$1,479.50.

Substructure plans were also prepared and submitted for the bridges at Plymouth avenue, Rochester, at South James street, Rome, and at Fort Plain.

Plans and estimates have also been prepared and submitted for the following described work:

New steel bulkheads for Braddock's Dam.

Repairs to the bridge over the Oswego Canal at Broadway, Fulton.

Reconstruction of the bridge over the Clark and Skinner Canal at Elk street, Buffalo.

Repairs to the lift bridge over the Oswego Canal at North Salina street, Syracuse.

Repairs to the swing bridge at the upper side-cut, Watervliet.

Substructure and superstructure plans are nearly completed for a lift bridge over the Erie Canal at Church street, Canajoharie.

All designs follow closely the best engineering practice of to-day. Effort has been constantly made to keep all details as

simple as possible, to reduce the necessity for future repairs, to make the efficiency of machinery for lift bridges as great as possible and to keep the cost as low as is consistent with giving to all parts the proper degree of strength.

During the year this bureau has inspected as frequently as necessary and whenever requested by the Division Engineers all bridge superstructures in course of construction, and, at the time of final acceptance, this bureau has been fully satisfied that the work has been done in substantial accordance with the plans and specifications.

The rolled steel shapes used for the bridge superstructures are rolled at several of the principal steel mills of the United States and are made up into trusses, floor beams, stringers, etc., at the shops of the various bridge companies. On account of the large expense attaching thereto it is impracticable for this bureau to have men in its employ located at mills and shops for the purpose of making, on what are comparatively small amounts of material, the necessary mill and shop inspection required by the specifications. Such inspection is therefore regularly made by a firm of inspecting engineers appointed by the State Engineer and Surveyor. These engineers are able to make the inspection at low cost because their representatives inspect in connection with the State work large quantities of materials for other parties. Reports of mill and shop inspection are regularly received and upon receipt are carefully examined in detail by this bureau.

Shop drawings of all structural steel and machinery are submitted by the contractors for approval. These drawings are carefully examined, and before approval is given it is required that they comply with the contract drawings and specifications.

During the session of the Legislature many approximate estimates of cost were made for various bridges and steel structures provided for by those bills which were referred to the State Engineer and Surveyor.

Whenever the Superintendent of Public Works has asked for examination of an existing structure, the examination has been

made as promptly as possible and report made upon the same with recommendations as to necessary repairs has been made to the State Engineer and Surveyor.

In like manner, plans for strengthening existing bridges or for building new bridges over the canals, submitted to the Superintendent of Public Works by street railway companies in connection with petitions for permission to cross the canal, have been carefully examined and report made thereon to the State Engineer and Surveyor. In some cases the plans submitted lacked a proper degree of strength, and the plans were required to be corrected before approval was given.

Under section 145 of chapter 568 of the Revised Statutes the town officials throughout the State have made many requests for the examination and approval of plans and specifications for new bridges or for the examination and approval of new bridges. Upon receipt of such requests, examination has been promptly made. In several instances the bridges examined had not been properly completed and the desired approval was withheld until the necessary corrections or alterations had been made.

The requests above mentioned are frequently made at the time of the completion of the bridge, at which time it is impracticable to amend the contract plans or specifications or to certify that the quality of the materials used is satisfactory. It is therefore often impossible to give unqualified approval to the completed structure. If the town officials would submit contract, plans and specifications for approval before signing the contract the results would be far more satisfactory in the great majority of cases.

In view especially of the "good roads" movement all highway bridges, whatever the span, should be designed to conform closely to the best modern specifications and to carry in safety a steam road roller rated at ten tons (actual weight loaded, thirteen tons). Provision should also be made for the mill inspection of material and the shop inspection of workmanship by some competent firm of inspecting engineers. To secure such a result

it is suggested as desirable that the highway law of the State be amended to require that before contracts for new highway bridges are signed the plans and specifications shall be examined and approved by the State Engineer.

The pontoon lift bridge over the Erie Canal at West avenue, Rochester, a new type of lift bridge, has been completed and has been in successful operation during the ensuing season of navigation.

Earnest effort has been made to do the work assigned to this bureau with promptness and thoroughness and at as low a cost as is consistent therewith.

Respectfully submitted,

WILLIAM R. DAVIS,

Chief Bridge Designer.

SURVEY OF ST. LAWRENCE COUNTY LINE.

ALBANY, N. Y., December 31, 1902.

HON. EDWARD A. BOND, *State Engineer and Surveyor, Albany,*
N. Y.

SIR.— I have the honor of submitting this preliminary report on the location of the south boundary line of the county of Saint Lawrence and the south boundary line of the county of Franklin, undertaken in accordance with the provisions of chapter 473, Laws of 1902.

Very truly yours,

C. H. FLANIGAN,
Engineer in Charge of Survey.

PRELIMINARY REPORT.

Chapter 473, section 1.—The State Engineer and Surveyor is hereby authorized and directed to locate, establish and permanently mark upon the ground the south boundary line and a portion of the southwest boundary line of the county of Saint Lawrence and south boundary line of the county of Franklin being the north boundary line of the counties of Lewis, Herkimer and Hamilton and a portion of the north boundary line of the county of Essex, State of New York. That the State Engineer make and file in his office a report of the field work done by him or under his direction in locating, establishing and permanently marking such boundary line together with a map which shall correctly show the location, establishment and permanent marking of such line upon the ground, and that he also file in his office all field notes, maps and data obtained and made by him in the location of such line; that said State Engineer and Surveyor upon the completion of his said report and of the said map cause true copies thereof to be filed in the office of the Comptroller and in each of the county clerk's offices of the counties of Saint Lawrence, Franklin, Herkimer, Hamilton, Lewis and Essex in the State of New York; that upon filing such report and map in the State Engineer's office, the office of the Comptroller and in the county clerk's offices of the counties of Saint Lawrence, Franklin, Herkimer, Hamilton, Lewis and

Essex, the same shall be presumptive evidence that the south boundary line and a portion of the southwest boundary line of the county of Saint Lawrence and the south boundary line of the county of Franklin, being the north boundary line of the counties of Herkimer, Hamilton and Lewis and a portion of the north boundary line of the county of Essex have been and are regularly, properly, duly and legally located, established and permanently marked upon the ground as shown by such report and map filed as herein provided, and it shall be conclusive evidence thereof from and after the expiration of one year from the date of such filing.

The several boundaries which this act of the Legislature calls for to be established and permanently marked upon the ground were originally defined by legislative enactments at the times when the counties above mentioned were created.

The county of Saint Lawrence was set off from the county of Oneida by act of March 3, 1802; the county of Franklin from the county of Clinton by act of March 11, 1808; the county of Herkimer from the county of Montgomery by act of February 16, 1791; the county of Lewis from the county of Oneida by act of March 28, 1805; the county of Essex from the county of Clinton by act of March 1, 1799, and the county of Hamilton from the county of Montgomery by act of April 12, 1816.

By CHAPTER 39 (R. L.), PASSED MARCH 26, 1813.

The south bounds of Saint Lawrence county are described as the north line of the Totten and Crossfield's Purchase.

The south bounds of Franklin county are described as the north bounds of the county of Montgomery.

The north bounds of Montgomery county are described as the south bounds of Macomb's Purchase.

The north bounds of Essex county are described as the south bounds of Macomb's Purchase.

The north bounds of Herkimer county are described as the south bounds of the county of Saint Lawrence.

The northerly bounds of Lewis county are described as the southwesterly bounds of the county of Saint Lawrence.

The north boundary of Hamilton county by the act creating it is described as being the south bounds of Macomb's Purchase.

It is obvious, then, that to carry out that part of chapter 473 which authorizes and directs the location of the south boundary of the county of Saint Lawrence and the south boundary of the county of Franklin, it is necessary to determine the location of the north line of the Totten and Crossfield Purchase and the south line of Macomb's Purchase.

The location of the north line of the Totten and Crossfield Purchase has been the subject of much costly and stubbornly contested litigation in the courts of our State for more than thirty years. This litigation has been based upon the claim that the location of this line as marked upon the ground is not in compliance with the terms of the original grant, and also because this north line consists of several lines which do not coincide with or are extensions of each other.

In the year 1772 certain Indians conveyed to his Majesty King George III a certain tract of land previously petitioned for by Joseph Totten and Stephen Crossfield and their associates, the west line of which was described as beginning at the northwest corner of John Bergen petition and runs N. 30° W. until a line coming west ten miles north of Crown Point shall intersect it.

In the same year one Archibald Campbell in company with some of the Indians made a partial survey of this tract running out the west line and a part of the north line. Campbell commenced his survey at the northwest corner of the John Bergen petition and ran N. 30° W. as called for by the grant, a distance of 59 miles, where he established what he designated "the northwest corner of the purchase;" thence he continued east a distance of about 27 miles, where his line having reached the summit of a high hill, he pointed out to the Indians, without continuing his survey further, the course of the line to the east; "they all agreed and were fully satisfied with the course to be continued and so chose to return home without going any further along said line." Campbell does not tell us in his field notes, or have

we been able to ascertain from any other source, why he established the northwest corner of the purchase at the point he did; nor does he state what relation this corner as placed by him bears to a point west of ten miles north of Crown Point.

In 1792 Alexander Macomb petitioned the Commissioners of the Land Office to purchase a certain vacant tract of land, the southerly bounds of which as stated in the petition is to be "the north bounds of the tract known by the name of Totten and Crossfield's Purchase." This petition was granted, and in 1796 one Medad Mitchell, acting for the Surveyor-General, made the survey dividing the purchase into six great tracts. Mitchell started the survey of the south line of Macomb's Purchase at the northwest corner of Totten and Crossfield's Purchase as established by Campbell and ran east on Campbell's line, re-marking for monuments the same trees marked by Campbell, a distance of about 28 miles, or about one-half mile east of where Campbell had ended his survey. Mitchell marked the easterly termination of his line as the southwest corner of Great Tract No. 1 and the southeast corner of Great Tract No. 2. From this corner he ran northerly a distance of 60 miles to the boundary line between the United States and Canada; thence easterly along this boundary 19 miles to the west bounds of the Old Military Tract; thence southerly along these bounds a distance of 58 miles 40 chains to the north bounds of Totten and Crossfield's Purchase; thence "westerly along said bounds of Totten and Crossfield's Purchase to the place of beginning." It is evident, however, that Mitchell did not actually run "westerly along said bounds of Totten and Crossfield's Purchase." The contents of Great Tract No. 1 as given by this survey were 722,040 acres and of Great Tract No. 2, 566,651 acres.

There was apparently a doubt in the mind of the Surveyor-General as to the "exactness" of the acreage in Great Tracts No. 1 and No. 2 as returned by Mitchell's survey, for in the following year Charles C. Brodhead, Deputy Surveyor-General, was assigned to ascertain it.

Brodhead commenced his survey at the southeast corner of the Old Military Tract and ran S. 88° 42' W. intersecting at 22 miles 11 chains from his starting point the division line between Great Tract No. 1 and the Old Military Tract as run the previous year by Mitchell. After running about 20 miles further west Brodhead stopped. Then he went to the St. Lawrence river and laid out the ten townships so called. After completing this work he returned to the northwest corner of Totten and Cross and ran east on the course of Campbell and Mitchell, finding the trees blazed by Mitchell for a distance of about 8½ miles. East of this point he claims Mitchell had not run. After extending his line 17½ miles further east Brodhead turns and runs north to a birch tree which Mitchell had marked for the southwest corner of Great Tract No. 1. From this point he ran east about 4½ miles, then south to connect with the line he had run from the southeast corner of the Old Military Tract. Brodhead gives the number of acres in Great Tract No. 1 as 821,819 and in Great Tract No. 2, 553,020.

In 1799 Benjamin Wright was employed by the proprietors of Macomb's Purchase to subdivide the purchase into sixty townships. He accepted for the south line of the purchase the line as marked by Campbell as far east as Campbell had run and from this point continued the line on the Campbell course to the west line of the Old Military Tract.

Between the years 1808 and 1821 John Richards, Deputy Surveyor-General, subdivided the townships in the Totten and Crossfield Purchase bordering upon the north line into lots.

The location of this north line as marked by Campbell, Mitchell and Wright and Brodhead's several lines evidently confused Richards, for in places he carried his allotment up to the Campbell, Mitchell and Wright line and in other places to the lines as run by Brodhead, thereby leaving gores or vacant strips of land unallotted.

The surveys above spoken of comprise all of what may be termed the original official surveys. Since these were performed many surveys have been made under the direction of individuals

and companies owning land touching this line in order that this boundary might be ascertained. The results of these private surveys have been of a negative nature, increasing rather than diminishing the uncertainty attached to the true location. They have, however, shown that the trees marking this line as blazed by Campbell, Mitchell, Brodhead, Wright and Richards were rapidly disappearing and that in the course of a few years' time, owing to age and the operations of lumbermen, all these visible and existing marks would be gone. It was this consideration which caused the authorities of the counties and towns bordering upon this line and also individuals whose lands were governed by this boundary to ask the Legislature to have this line officially located and permanently monumented before all evidences of the original markings had been destroyed. Their efforts resulted in the enactment of chapter 473.

As the most direct means of obtaining the opinions of all persons interested in the location of this line and in order that each might be given equal privileges of expressing his opinion the following circular letter was issued and mailed to all property owners, corporations, lawyers, surveyors, lumbermen and to all others who were known to have given thought and study to the history of the line and to be familiar with the existing lines as marked upon the ground:

"The Legislature has recently made an appropriation for the survey of county boundaries which have long been in dispute and which are now to be finally fixed and determined. State Engineer Edward A. Bond desires that all parties interested in this survey for the proper establishment of the location of the south boundary line of the counties of St. Lawrence and Franklin, Hamilton and Essex shall know that there will be a public meeting at his office in the city of Albany beginning with noon of Thursday, May 15, 1902, and continuing until all parties appearing and expressing a wish to present any facts or data in their possession bearing upon the proper location of said line may be between said counties, and the counties of Lewis, Herkimer, heard.

"Any parties desiring to do so may present their data in the form of printed briefs accompanied by a statement showing where their claims as set forth in the several briefs may be substantiated, and this announcement is made on April thirtieth in order to give ample notice of the proposed meeting.

"Persons desiring information in regard to this proposed survey and location and to the meeting herein called can communicate direct with Edward A. Bond, State Engineer and Surveyor, State Hall, Albany, N. Y."

In response to this letter there personally appeared at the office of the State Engineer on May fifteenth, Mr. Frank L. Bell, attorney for Messrs. Sisson and McEchron and the MacIntyre Company; Mr. W. E. Shortt, attorney for Mr. A. A. Low; Mr. Sam Child, representing the Aldrich Paper Company; Mr. B. D. McCoy, representing the International Paper Company; Mr. H. P. Flynn, for Mrs. T. W. Proctor; Mr. John Cantwell of Badger and Cantwell, attorneys for Mr. E. H. Litchfield; Mr. Patrick Moynahan, for W. C. Whitney and himself, and Messrs. Hosley and Anderson, for themselves. Besides these personal appearances briefs were submitted by Messrs. Masten and Nichols, attorneys for the MacIntyre Iron Company, by Mr. Hamilton Wallis and Badger and Cantwell, attorneys for Mr. E. H. Litchfield, and by Mr. Frank L. Bell. The brief of Mr. Richard L. Hand, counsel for Mr. George W. Sisson, in the suit of Litchfield vs. Sisson before Referee Henry T. Kellogg, the report of the referee and letters from surveyors who had at times been employed on different portions of the line, were also before the State Engineer.

At this meeting and in the briefs submitted the claims and contentions of all the interests were clearly set forth. It was admitted and conceded in by all:

First. That the south boundary lines of the counties of St. Lawrence and Franklin were coincident with the north boundary line of the Totten and Crossfield Purchase and the south boundary line of Macomb's Purchase.

Second. That Campbell, Mitchell, Brodhead and Wright did make surveys for the location of this line.

Third. That no survey of this line had ever been made in absolute compliance with the terms of the original grant of the Totten and Crossfield Purchase, the north boundary of which was described as follows, "and runs north 30 degrees west until a line coming west ten miles north of Crown Point shall intersect it thence east."

These were the main points on which all agreed. The points of contention were

First. That the line as marked by Campbell in 1772, by Mitchell in 1796 and by Wright in 1799-1800 was the true line.

Second. That the line as established by Deputy State Surveyor Brodhead in 1797 was the official and legal location as it had been established by a State official and because it was a continuation westerly of the south line of the Old Military Tract, which by the act creating it was to be bounded on the south by the north line of the Totten and Crossfield Purchase.

Third. That the true line had never been actually located on the ground and that to do so it would be necessary to follow out the wording of the original grant, which demanded the running of the line west as the needle pointed in 1772 from a point ten miles north of Crown Point.

Your instructions were that before any field work should be undertaken, time and attention should be given to a study of the different briefs and to a verification of the statements contained therein and that a thorough and more complete search than had yet been made be had for any other information which might assist in further throwing light on these ancient surveys. In accordance with these instructions a full and exhaustive examination was made of the records in your department and in the departments of the Comptroller and the Secretary of State. Interviews were had with surveyors whose recent work on this line had made them familiar with present conditions; private individuals who were thought to be in possession of old field notes or maps were written to and asked to furnish these notes

or maps, and every other source which gave promise of supplying information was searched into and examined.

After all sources of information had been exhausted and several months' time had been spent in a study of all the available data and in the consideration of the many methods of locating the line of the ground, it was determined that the best and proper method was to throw a preliminary base line from the northwest corner of the Totten and Crossfield Purchase as marked by Campbell to the southeast corner of Great Tract No. 3, Macomb's Purchase, as located by Wright.

The survey party was organized and took the field June thirtieth, establishing camp at the westerly base of Coney mountain about 1,000 feet west of where Campbell had ended his survey. The extension of the Campbell course to the summit of the mountain, from which point Campbell in his notes says he showed the Indians the course of the line to the east, as made by Mitchell and Wright, was easily traced. On the summit of the mountain where this extended line crossed was found the trunk of a fallen tree showing ancient markings. The exact age of these markings could not be definitely determined, as the tree had been down for a number of years. We assumed that it was one of Wright's trees — our assumption was afterwards proven to be correct — and established our initial station for the running of our preliminary base line at the point in the ground that the tree when standing occupied.

Being desirous of getting as long a sight as possible to the west which we could use as a constant foresight, a part of the survey force was directed to follow the Campbell line west and ascertain the highest mountain which he crossed. Considerable time was consumed and difficulties experienced in doing this, as the ridges which the line crossed were of slight difference in elevation so that much timber had to be cut and many points tried before it was ascertained that Cage Lake mountain, about 25 miles west of our initial transit station, was the highest point on the Campbell line between the "northwest corner" and Coney mountain. A heliotrope station was established on

the summit of Cage Lake mountain on the Campbell line as a foresight from Coney mountain and a transit base line run between the two points.

In the running of this straight base line we crossed and re-crossed and crossed again the compass line of Campbell's, sometimes being to the north of it and then to the south of it, and for a long distance right on it, our greatest divergence being just west of the village of Long Lake West, where we were about 150 feet north of it. Having reached with our transit line the station on Cage Lake mountain, we found that from it we could get a sight direct to the "northwest corner," thus allowing us to command the entire length of the Campbell line from this one station. In order to reach the "northwest corner" from our station on Cage Lake mountain it was necessary to make an angle with our base line from Coney mountain to Cage Lake mountain of $8^{\circ} 44'$ to the south.

Having carried the base line to the northwest corner, the survey party returned to the initial transit station on Coney mountain to extend the base line east. A point on Wright's line where it crosses Mt. Seward about 16 miles east of Coney mountain was taken for a foresight and the station on Cage Lake mountain for a backsight. Our line connecting these two stations showed an angle at Coney of $3^{\circ} 38'$ to the south.

The running of the base line was then continued east from Coney and carried about four miles when the survey party was prevented by a criminal warrant from proceeding further across Township 25, Great Tract No. 1, Macomb's Purchase. We then went to our station on Seward and extended the base line east from there about six miles to the high ridge west of the Preston ponds. From this high ridge by deflecting $1^{\circ} 25' 40''$ we shot directly to the southeast corner of Great Tract No. 1, Macomb's Purchase, as marked by Wright. This corner is the easterly end of the south line of Macomb's Purchase as determined by Wright and is located in the Middle Preston pond near the easterly shore.

The season was now so far advanced that further field work was considered unprofitable and the survey party was disbanded.

The chief results of the season's work may be briefly summarized as follows:

The running of 40 miles of base line; the tying into this base line of the surveys of Campbell, Mitchell, Brodhead, Wright and Richards, the location of all township and lot corners in the Totten and Crossfield Purchase and Macomb's Purchase, the topography of the country, the line crosses and the ascertaining of the magnetic declination at about 300 different points on the base line.

C. H. FLANIGAN.

REPORT
OF THE
DIVISION ENGINEER
OF THE
EASTERN DIVISION

For the Year Ending September 30, 1902.

Eastern Division.

ALBANY, October 1, 1902.

Hon. EDWARD A. BOND, *State Engineer and Surveyor*:

DEAR SIR.— I have the honor to submit to you the annual report for the eastern division of your Department for the fiscal year ending September 30, 1902.

CANALS AND SPECIAL WORK.

This division embraces about 106 miles of the Erie Canal extending from Albany to the east line of Oneida county, near Utica; 66 miles of the Champlain Canal, from Watervliet to Whitehall; 12 miles of the Glens Falls Feeder, the Port Schuyler and Watervliet sidecuts, the Albany basin and the pond above the Troy dam, amounting in all to 188.36 miles of navigable water. There are three short unnavigable feeders from the Mohawk river at Rexford Flats, Little Falls and Rocky Rift, and one from the Schoharie creek at Fort Hunter, amounting in all to 5.13 miles.

There were no breaks of any importance in the canals on this division during the past year.

EXTRAORDINARY REPAIRS.

WORK COMPLETED DURING YEAR ENDING SEPTEMBER 30, 1902.

For constructing a swing bridge over the Champlain Canal near Burton's Saw Mill in the town of Waterford, Saratoga county, N. Y.:

Chapter 629, Laws of 1898; chapter 219, Laws of 1899; chapter 443, Laws of 1900.

Owego Bridge Co., contractors.

F. N. Sanders, engineer in charge.

Plans approved by Canal Board, October 15, 1900. Contract dated, November 15, 1900. Work started, December, 1900. Contract completed, October, 1901.

| | |
|-------------------------------|-------------|
| Appropriation | \$12,000 00 |
| Engineer's estimate | 10,150 00 |
| Final estimate | 9,220 00 |

This work is described more in detail on page 190, State Engineer's Report for 1901.

For improving the Shinnecock and Peconic Canal, Long Island:

Chapter 419, Laws of 1900.

Brummelkamp & Lane, contractors.

John R. Kaley, engineer in charge.

Contract dated, November 1, 1900. Work started, May, 1901. Contract completed, February, 1902.

| | |
|--|-------------|
| Appropriation | \$30,000 00 |
| Engineer's estimate (original) | 12,430 00 |
| Engineer's estimate for extra work | 5,500 00 |
| Engineer's estimate (total) | 17,930 00 |
| Final estimate | 16,569 76 |

The law making this appropriation did not mention the State Engineer in any way, but at the request of the Superintendent of Public Works plans were prepared for improving and repairing the tide gates across the canal.

It was impossible to examine the timber in these gates below the sea-level at the time the plans were prepared, without constructing two expensive coffer-dams across the canal and pumping out the water between the dams. After the contract was let, and the contractor had built the two dams and pumped out the water, it was apparent that all the old timber in the tide gates that was below sea-level had been ruined by the teredo navalis.

An extra agreement was made with the contractor, providing for the use of concrete beneath the bottom of the tide gates and of creosoted timber where it was impracticable to use concrete. This work has been completed, and the coffer-

dams have been removed as required by contract and the extra agreement, within the estimated cost, leaving a balance of \$13,430.24, which is available for dredging and other improvements.

For constructing a bridge over the Champlain Canal at Fulton street, Waterford, Saratoga county, N. Y.:

Chapter 697, Laws of 1901.

John Dunfee & Co., contractors.

Ralph Russell, engineer in charge until April, 1902; after this date, John R. Kaley.

Plans approved by Canal Board, August 27, 1901. Contract dated, September 27, 1901. Work started, December, 1901. Contract completed, April, 1902.

| | |
|-------------------------------|-------------|
| Appropriation | \$10,000 00 |
| Engineer's estimate | 8,585 00 |
| Final estimate | 8,378 11 |

For constructing a bridge (Green's bridge) over the Glens Falls Feeder in the town of Queensbury, Warren County, N. Y.:

Chapter 423, Laws of 1901.

Beardon & Burnham, contractors.

W. J. Gilmour, engineer in charge.

Plans approved by Canal Board, August 27, 1901. Contract dated, September 24, 1901. Work started, January, 1902. Contract completed, June, 1902.

| | |
|-------------------------------|------------|
| Appropriation | \$6,000 00 |
| Engineer's estimate | 4,944 50 |
| Final estimate | 4,943 52 |

WORK PENDING SEPTEMBER 30, 1902.

For excavating a channel approach to the lower end of the lock in the dam across the Saranac River recently built by Joseph H. Connors:

Contract for this work was entered into on July 23, 1901. Work was started in August, 1901, and about 80 per cent. completed. It is expected that the work will be finished when

the water in Saranac River is low enough to permit the work to be done at reasonable expense.

| | |
|---|----------|
| Engineer's estimate at contract prices..... | \$600 00 |
| Payments to date | 408 00 |

Engineer in charge, F. B. Morss.

For constructing a bridge over the Champlain Canal at Ontario street, Cohoes:

Contract for this work was entered into on October 23, 1901, with the American Bridge Co. Work was started in March, 1902. Substructure was completed in April, 1902. Superstructure was not completed on September 30, 1902, the delay being caused by inability of contractors to obtain steel.

| | |
|--|-------------|
| Engineer's estimate at contract price was..... | \$10,405 50 |
| Payments to date..... | 7,038 00 |

Engineer in charge, John R. Kaley.

For constructing a bridge and approaches thereto over the Erie Canal just west of the Upper Mohawk Aqueduct, near Rexford Flats, Saratoga and Schenectady counties:

Contract for this work was entered into October 23, 1901, with the American Bridge Co. Work was started in December, 1901. Substructure was completed in April, 1902. Superstructure is nearly completed on September 30, 1902, delay being caused by inability of contractors to obtain steel.

| | |
|--|------------|
| Engineer's estimate at contract price..... | \$8,128 00 |
| Payments to date | 5,796 00 |

Engineer in charge, T. A. Hendrickson, until May, 1902; after this date, John R. Kaley.

For constructing a dam on Beaver River near Stillwater, in the town of Webb, Herkimer county:

Contract for this work was entered into on December 24, 1901, with Strobel & Moynahan. Work was started in January, 1902. Fifty per cent. of the clearing, the tunnel gate-house and the concrete spillway foundations were completed on September 30, 1902.

| | |
|---|-------------|
| Engineer's estimate at contract prices..... | \$75,045 00 |
| Payments to date | 26,514 00 |

Engineer in charge, M. H. Ranney.

For building a sea wall between the Sound and Orient Harbor on that part of Long Island lying between the villages of East Marion and of Orient in the town of Southold, Suffolk county, Long Island:

Contract for this work was entered into on August 1, 1902, with Joseph Hanigan. Work was started in August, 1902, and is nearly one-half completed on September 30, 1902.

| | |
|---|-------------|
| Engineer's estimate at contract prices..... | \$13,382 00 |
| Payments to date | 5,130 00 |

Engineer in charge, C. T. Middlebrook.

For constructing a bridge over the Otsquago Creek, in the village of Fort Plain, town of Minden, Montgomery county:

Contract for this work was entered into on July 21, 1902, with the Owego Bridge Co. Work has not yet started.

| | |
|---|------------|
| Engineer's estimate at contract prices..... | \$6,822 50 |
|---|------------|

For constructing retaining walls, sidewalks and curbing at the approaches to the bridge over the Erie Canal at Fourteenth street, Watervliet, and for rebuilding the vertical slope walls, and excavating the channel of Dry River in said city:

Contract for this work was entered into on September 8, 1902, with Snell Brothers and J. Hanigan. Work has not yet started.

| | |
|---|-------------|
| Engineer's estimate at contract prices..... | \$12,234 75 |
|---|-------------|

The disbursements of the funds in several appropriations has been made on this division, among which are:

Chapter 411, Laws of 1900.— Barge Canal survey.

Chapter 473, Laws of 1902.— Survey St. Lawrence county line.

| | |
|----------------------------|-------------------------------|
| Chapter 645, Laws of 1901. | } Surveys for Forest Preserve |
| Chapter 594, Laws of 1902. | |

Board.

| | |
|----------------------------|------------------------------|
| Chapter 419, Laws of 1900. | } Surveys for State Court of |
| Chapter 645, Laws of 1901. | |

Claims.

| | |
|----------------------------|----------------------------------|
| Chapter 645, Laws of 1901. | } For making examination of mon- |
| Chapter 419, Laws of 1900. | |
| Chapter 594, Laws of 1902. | |

uments and surveys and maps
of the boundary lines of the
State.

Chapter 645, Laws of 1901.— For copying and preserving old maps, surveys, etc.

Chapter 594, Laws of 1902.— For hydrographic work connected with the measurement of streams and flow of water in co-operation with the United States Geological Survey.

| | |
|----------------------------|--|
| Chapter 594, Laws of 1902. | } For topographical work in connection with the United States Geological Survey. |
| Chapter 645, Laws of 1901. | |

IMPROVEMENT PUBLIC HIGHWAYS.

(Under chapter 115, Laws of 1898.)

There have been 66 roads under contract on the Eastern Division during the past year, having a total length of 209 miles, at an estimated cost of \$1,468,345.

The excessive rainfall during the past season has greatly delayed the progress of the work.

WORK COMPLETED DURING THE YEAR ENDING
SEPTEMBER 30, 1902.

DELAWARE TURNPIKE, SECTION 1, ROAD NO. 7, ALBANY COUNTY,
N. Y.

Length of road, 1.04 miles.

Width of macadam, 15 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$13,256.

Contract dated, May 12, 1900.

Work started, May, 1900.

Work completed, July, 1902.

Amount of final estimate, \$14,041.24.

Contractors, C. H. Lutjens & Son; assigned by them on April 15, 1901, to Donovan Bros.

Engineer in charge, T. A. Hendrickson.

This road starts at the southwesterly city line of Albany and crosses the Normanskill at Normansville. The old road here had a very steep grade of over 14 per cent. where it entered the valley of the Normanskill and also a steep grade in leaving this valley. The new road has a new location, which has a grade of about 3 per cent. for the most of the distance, and nothing over 5 per cent. The weight of all loads entering and leaving the city of Albany from the southwesterly portion of the county was determined by the load which could be drawn up these hills. With the new grades, as heavy loads can be drawn in and out of this valley as on other portions of the road.

HASTINGS-ARDSLEY ROAD No. 17, WESTCHESTER COUNTY, N. Y.

Length of road, 0.6 mile.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$5,445.

Contract dated, May 12, 1900.

Work started, August, 1900.

Work finished, June, 1902.

Contractors, C. H. Lutjens & Son.

Engineers in charge, Ralph Russell and E. C. Clark.

After completing 99 per cent. of this work in 1900, the contractors, C. H. Lutjens & Son, refused to finish the work, and the remainder of the work was re-let to Harry L. Smith, who completed the contract in June, 1902, and received \$1,132.

Road No. 17 starts at the northerly village line of Hastings and extends to the village line of Ardsley. The bottom course of 4 inches is of local stone and the top course of 2 inches of trap rock. Limestone screenings were used throughout as a binder.

ARDSLEY-ELMSFORD ROAD No. 18, SECTION 1, WESTCHESTER COUNTY, N. Y.

Length of road, 3.06 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$26,798.

Contract dated, May 12, 1900.

Work started, June, 1900.

Work completed, November, 1901.

Contractors, C. H. Lutjens & Son.

Engineers in charge, Ralph Russell and G. A. Ensign in 1900, Ralph Russell and F. S. Strong in 1901.

After completing 33 per cent. of the road in 1900, and receiving \$5,414.50, the contractors, C. H. Lutjens & Son, refused to finish the work in the spring of 1901, and the remainder of the work was re-let to the Bellew & Merritt Company, who finished the road, and received \$19,079.70.

Road No. 18 starts at the north village line of Ardsley and ends near Elmsford station. The bottom course of 4 inches is formed of local stone and other stone of similar quality, and the top course of 2 inches is of trap rock. Limestone screenings were used for a binder for the top course and local stone screenings for the bottom course.

This road will form part of the west side highway through the county connecting with road No. 17 on the south and road No. 34 on the north.

MAMARONECK-WHITE PLAINS ROAD No. 19, WESTCHESTER COUNTY, N. Y.

Length of road, 2.80 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$29,222.

Contract dated, July 23, 1900.

Work started, August, 1900.

Work finished, October, 1901.

Amount of final estimate, \$23,951.51.

Contractor, Daniel Murray.

Engineers in charge, Ralph Russell and Perry Filkin.

Road No. 19 starts at William McCabe's on Weaver street in the town of Mamaroneck and extends to the old Mamaroneck-White Plains road in the town of Scarsdale. The bottom course of four inches is of local gneiss rock and the top course of two inches of trap rock from Connecticut. Limestone screenings were used throughout as a binder.

This is the southern part of a fine macadam highway extending from Long Island Sound northerly across the county to the Putnam county line on the easterly side of Westchester county.

WHITE PLAINS-ARMONK ROAD No. 20, SECTION 1, WESTCHESTER COUNTY, N. Y.

Length of road, 3.77 miles.

Width of macadam, 14 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$31,545.

Contract dated, May 12, 1900.

Work started, June, 1900.

Work completed in November, 1901.

Contractors, C. H. Lutjens & Son.

Engineers in charge, Ralph Russell and L. L. Melius.

The contractors, C. H. Lutjens & Son, completed 79 per cent. of the work in 1900, and received \$15,464.76, but in the spring of 1901 refused to complete the work and it was re-let to G. H. Smith, who finished the contract in November, 1901, and received \$12,767.62.

Road No. 20 starts at the northerly corporation line of White Plains and extends northerly to a cross road leading to King street. The bottom course of four inches is of a local granitic rock and the top course of two inches is of trap rock. Limestone screenings were used throughout as a binder. This road will form part of the east side highway across the county connecting with road No. 35 on the north. It will form a delightful drive for people of White Plains and vicinity, winding along the easterly shore of the beautiful Kensico reservoir, which furnishes a portion of New York city's water supply.

LOUDON ROAD No. 22, SECTION 1, ALBANY COUNTY, N. Y.

Length of road, 3.41 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$37,115.

Contract dated, June 25, 1900.

Work started, July, 1900.

Work finished, October, 1901.

Amount of final estimate, \$32,615.

Contractor, T. H. Karr.

Engineers in charge, F. N. Sanders, until June 20, 1901; after this date, F. B. Morss.

Road No. 22 starts at the northerly city line of Albany and extends in a northerly direction to the M. E. church in the village of Newtonville. The bottom course of 4 inches is of Clinton Point limestone, except about a mile which is of trap rock. The top course of 2 inches is of trap rock. Clinton Point limestone screenings were used throughout as a binder.

When section 2 of this road is built it will connect the city of Albany and the city of Cohoes, and will form a beautiful drive overlooking the Hudson River.

TROY AND GREENBUSH ROAD No. 26, SECTION 2, RENSSELAER
COUNTY, N. Y.

Length of road, 2.59 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$23,576.30.

Contract dated, June 20, 1901.

Work started, July, 1901.

Work completed, September, 1902.

Amount of final estimate, \$20,242.95.

Contractor, town of North Greenbush.

Engineers in charge, A. M. Evans, until October, 1901; after this date, Perry Filkin.

Road No. 26 starts from a point about 120 feet south of the house of James Wendell and ends at the intersection of the road to Bath at Defreestville. The bottom course of 4 inches is of Clinton Point limestone and the top course of 2 inches is of trap rock. Clinton Point limestone screenings was used throughout as a binder, except the mile nearest Troy is built with both courses of trap rock, sand being used for binder on bottom course and trap rock screenings on top course. This road is a continuation of road No. 11, and forms the principal highway between Troy and Rensselaer on the east side of the Hudson River, opposite Albany.

AMSTERDAM—MINAVILLE ROAD No. 32, MONTGOMERY COUNTY, N. Y.

Length of road, 2.65 miles.

Width of macadam, 12 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$17,510.

Contract dated, June 5, 1901.

Work started, June, 1901.

Work completed, July, 1902.

Amount of final estimate, \$15,860.16.

Contractors, Snell Brothers.

Engineers in charge, O. J. Dempster, until October, 1901; after this date, F. B. Morss.

This road starts at the city line of Amsterdam and extends in a southerly direction to a point near the village of Minaville. It is one of the principal highways entering Amsterdam from the south. Both the bottom and top courses of the entire road, except the mile nearest Amsterdam, are formed of crushed cobble stone. Local stone screenings were used in the bottom course and limestone screenings in the top course. The mile of road located nearest Amsterdam is made of limestone with limestone screenings throughout, as it is nearly all a 5 or 6 per cent. grade.

Road No. 32 was a heavy clay road, and, before improvement, was almost impassable in wet weather.

ARDSLEY—ELMSFORD ROAD No. 34, SECTION 2, WESTCHESTER COUNTY, N. Y.

Length of road, 2.16 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$21,838.

Contract dated, May 31, 1901.

Work started, June, 1901.

Work completed, November, 1901.

Amount of final estimate, \$18,940.

Contractors, McCabe & Duffy.

Engineers in charge, Ralph Russel and F. S. Strong.

This road starts at Elmsford station and extends northerly to the Westchester County Farm. From station 161 + 85 to station 207 both bottom and top courses are of trap rock, with limestone screenings as a binder. From station 207 to station 242 the bottom course is of local stone and local stone screenings, and the top course of trap rock with limestone screenings. From station 242 to end of road at the Westchester County Farm, the bottom course is of local stone and local stone screenings and the top course of local stone and limestone screenings.

Road No. 34 forms part of the west side highway across the county, joining road No. 18 on the south and road No. 52 on the north.

WHITE PLAINS-ARMONK ROAD NO. 35, SECTION 2, WESTCHESTER
COUNTY, N. Y.

Length of road, 3.21 miles.

Width of macadam, 14 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$27,023.

Contract dated, July 22, 1901.

Work started, August, 1901.

Work completed, September, 1902.

Amount of final estimate, \$22,800.

Contractors, Eldert & Johanknecht.

Engineers in charge, Ralph Russell and L. L. Melius.

This road starts at the cross road leading to King street and ends at the cross road to Port Chester. Both bottom and top courses are made of local stone and local stone screenings are used for a binder, with the exception that one-half of the screenings for the top course are of limestone.

Road No. 35 forms part of the east side highway across the county, joining road No. 20 on the south and road No. 50 on the north.

**SAUGERTIES-WOODSTOCK ROAD No. 37, SECTION 1, ULSTER COUNTY,
N. Y.**

Length of road, 4 miles.

Width of macadam, 12 feet.

Width of roadway, 16, 18, 20 and 22 feet.

Engineer's estimate of total cost, \$22,910.

Contract dated, June 10, 1901.

Work started, June, 1901.

Work completed, August, 1902.

Amount of final estimate, \$20,660.31.

Contractor, Edgar Snyder & Co.

Engineer in charge, F. M. Williams in 1901. During 1902 the engineers in charge were M. B. Palmer and L. G. Fenton. In March, 1902, Jacob D. Wurtz was appointed receiver for the firm of Edgar Snyder & Company and completed the road.

Road No. 37 starts at the bridge over the Sawkill at Bearsville and extends easterly through the village of Woodstock to the town line of Woodstock. Both bottom and top courses and screenings for the binder are obtained by crushing the local bluestone, cobblestones and boulders.

This road is in the valley of the Sawkill along the base of Overlook Mountain in the Catskills. The road forms a straight line for more than a mile between Bearsville and Woodstock.

**WATERFORD-MECHANICVILLE ROAD No. 39, SECTION 1, SARATOGA
COUNTY, N. Y.**

Length of road, 1.51 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$11,970.

Contract dated, July 22, 1901.

Work started, August, 1901.

Work completed, July, 1902.

Amount of final estimate, \$11,212.

Contractor, E. & J. E. Martin.

Engineer in charge, G. A. Ensign in 1901; in 1902, F. B. Morss.

This road starts from a point about 1,420 feet north of the village line of Waterford and extends northerly to the town line of Half Moon. The bottom course of four inches is of Canajoharie limestone, and the top course of two inches of trap rock. Canajoharie limestone screenings are used throughout as a binder.

Road No. 39 and road No. 59, which joins it on the north, constitute the principal highway on the west side of the Hudson river between Waterford, Cohoes, Troy and Mechanicville.

DELAWARE TURNPIKE, SECTION 2, ROAD NO. 41, ALBANY COUNTY,
N. Y.

Length of road, 2.74 miles.

Width of macadam, 15 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$22,497.20.

Contract dated, June 5, 1901.

Work started, June, 1901.

Work completed, June, 1902.

Amount of final estimate, \$20,435.

Contractor, Callanan Road Improvement Co.

Engineer in charge, T. A. Hendrickson in 1901; in 1902, H. C. Titus.

Road No. 41 starts at a point about 300 feet southwest of the house of M. H. Bender, where road No. 7 ends, and ends about 600 feet southwest of the cross road to Slingerlands. Both bottom and top courses, and the screenings used for binder are limestone from the Callanan quarries at South Bethlehem, Albany county, N. Y.

For 200 years all the traffic entering Albany from the southwest has had to drag through sand, nearly hub deep, on this road. A fine macadam road will soon permit the drawing of as heavy loads here as on the pavements of Albany. It is expected to extend this road to Slingerlands, Voorheesville, Guilderland and Altamont, also to Union Church and Clarksville.

NEWBURGH-WOODBURY ROAD No. 42, ORANGE COUNTY, N. Y.

Length of road, 11 miles.

Width of roadway, 16 and 22 feet.

Engineer's estimate of total cost, \$22,330.

Contract dated, June 18, 1901.

Work started, July, 1901.

Work completed, May, 1902.

Amount of final estimate, \$20,247.20.

Contractors, Board of Supervisors of Orange County.

Engineers in charge, C. H. Flanigan and H. P. Willis.

Road No. 42 starts at the city line of Newburgh near the Quassaic bridge and extends southerly to the Moodna Creek at Orr's Mills, where it follows the valley of this and Woodbury creek to the arch bridge over the Woodbury creek at Woodbury. The roadway is formed of the best earth found in the necessary excavations, and it is expected that this road will be one of the main highways from New York to Newburgh on the west side of the Hudson River. The grades are all reduced to 5 per cent., and the drainage greatly improved. The surface has been covered with gravel, largely at the expense of the Orange County Construction Co.

COCHECTON TURNPIKE, SECTION 2, ROAD No. 43, ORANGE COUNTY, N. Y.

Length of road, 7.55 miles.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$22,928.

Contract dated, June 18, 1901.

Work started, July, 1901.

Work completed, August, 1902.

Amount of final estimate, \$20,789.80.

Contractors, Board of Supervisors of Orange county.

Engineers in charge, C. H. Flanigan and C. H. McCulloch, in 1902.

Road No. 43 starts from the village line of Montgomery and extends easterly to within about 2 miles of the city line of New-

burgh. The grades on this road are all lessened so that none exceeds 6 per cent., and the drainage is greatly improved. The tops of the rocky knolls are removed, and the shale rock obtained therefrom is placed on the surface of the road, largely at the expense of the Orange County Construction Co.

GOSHEN-FLORIDA ROAD No. 44, ORANGE COUNTY, N. Y.

Length of road, 4.22 miles.

Width of roadway, 18 feet.

Engineer's estimate of total cost, \$9,690.

Contract dated, June 18, 1901.

Work started, September, 1901.

Work completed, June, 1902.

Amount of final estimate, \$8,757.30.

Contractors, Board of Supervisors of Orange County.

Engineers in charge, C. H. Flanigan and H. Eltinge Breed.

Road No. 44 starts at the village line of Goshen and extends in a southerly direction to the village of Florida. The heavy grades on this road are reduced so that none exceeds 6 per cent., the drainage is greatly improved and the surface is covered with gravel, largely at the expense of the Orange County Construction Co.

MIDDLETOWN-PINE BUSH ROAD No. 45, ORANGE COUNTY, N. Y.

Length of road, 9.25 miles.

Width of roadway, 16 feet.

Engineer's estimate of total cost, \$13,770.

Contract dated, June 18, 1901.

Work started, July, 1901.

Work completed, June, 1902.

Amount of final estimate, \$12,467.80.

Contractors, Board of Supervisors of Orange County.

Engineers in charge, C. H. Flanigan and W. M. Payne.

Road No. 45 starts at the village of Pine Bush and extends southerly to within about 1 mile of the toll road leading to Middletown, with which it is connected by road No. 114. The

grades on this road were all reduced so that none exceeds 6 per cent., and the drainage is greatly improved. The surface is covered with a layer of gravel, largely at the expense of the Orange County Construction Co.

UNIONVILLE-McKEELS CORNERS ROAD No. 52, WESTCHESTER COUNTY, N. Y.

Length of road, 3.69 miles.

Width of macadam, 12 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$30,411.

Contract dated, May 31, 1901.

Work started, July, 1901.

Work completed, July, 1902.

Amount of final estimate, \$26,870.

Contractors, McCabe & Duffy.

Engineers in charge, Ralph Russell and F. S. Strong.

The bottom and top courses on this road are formed of local granitic stone. Local screenings are used for the bottom course and limestone screenings for the top course as binder.

Road No. 52 forms part of the west side highway across the county, joining road No. 34 on the south at the Westchester County Farm and road No. 53 on the north.

McKEELS CORNERS-BRIAR CLIFF MANOR ROAD No. 53, WESTCHESTER COUNTY, N. Y.

Length of road, 1.76 miles.

Width of macadam, 12 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$13,968.

Contract dated, May 31, 1901.

Work started, April, 1902.

Work completed, August, 1902.

Amount of final estimate, \$12,644.

Contractors, McCabe & Duffy.

Engineers in charge, Ralph Russell and F. S. Strong.

Road No. 53 will form part of the west side highways across the county, joining road No. 52 on the south and road No. 54 on the north.

HOAG'S CORNERS ROAD No. 55, RENSSELAER COUNTY, N. Y.

Length of road, 3.15 miles.

Width of roadway, 16 feet.

Engineer's estimate of total cost, \$9,955.

Contract dated, July 16, 1901.

Work started, July, 1901.

Work completed, November, 1901.

Contractor, T. H. Karr.

Amount of final estimate, \$9,795.

Engineer in charge, Frank Roberts.

This road is on the direct route from Troy, N. Y., to Pittsfield, Mass. It starts at Hoag's Corners and extends northerly to the Troy turnpike. The grades, which, in some cases, were very steep, are all reduced so that they will not exceed 6 per cent. The drainage is greatly improved by providing side ditches and giving the road the proper crown. The material on the surface, which is rolled with a 10-ton roller, is the best that can be found in the necessary excavation.

PLATTSBURG-KEESEVILLE ROAD No. 56, SECTION 1, CLINTON COUNTY, N. Y.

Length of road, 2.82 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$18,910.

Contract dated, June 7, 1901.

Work started, June, 1901.

Work completed, June, 1902.

Amount of final estimate, \$17,070.81.

Contractors, Prescott & Buckley Construction Company.

Engineers in charge, Clark Brown until August 16, 1901; after this date, M. H. Ranney, in 1901; in 1902, T. A. Hendrickson.

This road starts at the Chauteaugay railroad crossing and extends southerly to the cross road to Lake Champlain near Salmon River, and is one of the principal roads leading into Plattsburg from the southwest. It was a very sandy road and almost impassable with a heavy load. It is now macadamized with limestone from the bed of the Salmon River in both courses, limestone screenings being used as a binder throughout.

GLENS FALLS-SARATOGA ROAD No. 58, SECTION 1, SARATOGA
COUNTY, N. Y.

Length of road, 6.06 miles.

Width of macadam, 12 feet.

Width of roadway, 16 and 22 feet.

Engineer's estimate of total cost, \$36,532.

Contract dated, June 4, 1901.

Work started, June, 1901.

Work completed, August, 1902.

Amount of final estimate, \$31,330.

Contractors, Reardon & Burnham.

Engineers in charge, W. J. Gilmour, until July, 1902; after this date H. C. Titus.

Road No. 58 was the most sandy and the worst portion of the road between Saratoga and Glens Falls. The bottom and top courses and the screenings for binder are obtained by crushing the local granitic rock. Two steep grades are reduced on this road so as not to exceed 6 per cent by making heavy cuts and adjacent fills.

AMSTERDAM-MINAVILLE (SECTION 2) ROAD No. 96, TOWN OF
FLORIDA, MONTGOMERY COUNTY, N. Y.

Length of road, 0.644 miles.

Width of macadam, 12 and 14 feet.

Width of roadway, 22 feet.

Engineer's estimate total cost, \$6,430.

Contract dated, May 17, 1902.

Work started, May, 1902.

Work finished, August, 1902.

Amount of final estimate, \$6,400.

Contractor, Snell Brothers.

Engineers in charge, F. B. Morss and H. E. Poole.

This road extends from Road No. 32, to and through the village of Minaville.

Crushed local fieldstone were used for both courses, and local fieldstone screenings for binder.

GRANVILLE-TROY STAGE ROAD No. 104, TOWN OF GRANVILLE,
WASHINGTON COUNTY, N. Y.

Length of road, 1.25 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate, total cost, \$10,850.

Contract dated, May 12, 1902.

Work started, July, 1902.

Work finished, September, 1902.

Amount of final estimate, \$9,837.96.

Contractor, Bellew & Merritt Co.

Engineer in charge, H. C. Titus.

Road No. 104 extends from the village limits of Granville southerly 1.25 miles. It will be used by those interested in the roofing slate quarries and the farming country south of Granville. Limestone from near Saratoga Springs was used for both courses, and sand and limestone screenings for binder.

WORK PENDING SEPTEMBER 30, 1902.

TROY AND BRUNSWICK ROAD No. 25, SECTION 2, RENSSELAER
COUNTY, N. Y.

Length of road, 3.05 miles.

Width of macadam, 15 feet.

Width of roadway, 22 to 25 feet.

Engineer's estimate of total cost, \$24,926.

Contract dated, July 16, 1901.

Work started, April, 1902.

Work completed, to September 30, 1902, 89 per cent.

Contractor, T. H. Karr.

Engineer in charge, R. J. Marcher.

This road starts about one-half mile northeasterly from the city line of Troy and ends about 300 feet westerly from the brick church at the intersection of the Stone road with the road to Cropseyville, and crushed local quartzite is being used for both courses on this road, and sandy loam and quartzite screenings for binder.

Road No. 25 is a part of one of the principal highways leading from Troy easterly to the New England States. It connects on the west with road No. 10, finished last year, and will connect on the east with road No. 84, to be started next year. This highway has a very heavy traffic, and was macadamized about sixty years ago, but is now very rough.

ULSTER AND DELAWARE TURNPIKE, SECTION 3, ROAD NO. 31, ULSTER COUNTY, N. Y.

Length of road, 5.72 miles.

Width of macadam, 12 and 16 feet.

Width of roadway, 16 and 22 feet.

Engineer's estimate of total cost, \$41,728.

Contract dated, June 10, 1901.

Work started, June, 1901.

Work completed to October 1, 1902, 99 per cent.

Contractor, town of Shandaken.

Engineer in charge, F. N. Sanders.

Road No. 31 starts at the village line of Pine Hill and extends southeasterly through the village of Shandaken. This road is a portion of the old Ulster and Delaware turnpike leading from Kingston to central New York, and is one of the principal highways in this section of the State. The bottom course of 3 inches is of local bluestone and crushed boulders and the top course of 3 inches is of the same materials. Local screenings are used as a binder throughout.

Road No. 31, with the Ulster and Delaware turnpike, section 1 (finished 1901), and the Ulster and Delaware turnpike, section 2, road No. 117, will form one of the most beautiful drives in the State, winding along the valley of the Esopus Creek through the Catskill mountains for a distance of nearly 20 miles.

GLOVERSVILLE-MAYFIELD ROAD NO. 33, FULTON COUNTY, N. Y.

Length of road, 4.04 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$33,720.

Contract dated, June 5, 1901.

Work started, June, 1901.

Work completed to October 1, 1902; 63 per cent.

Contractor, John R. Briggs; assigned by him on October 7, 1901, to Alfred D. Norton.

Engineer in charge, H. W. DeGraff.

This road starts at the city line of Gloversville and extends northerly to the corporation line of the village of Mayfield. The bottom and top courses and screenings were all obtained by crushing a hard local granitic rock for the two miles nearest Mayfield.

Road No. 33 is the principal highway between the city of Gloversville and the village of Mayfield.

Two dangerous grade crossings on the Fonda, Johnstown and Gloversville Railroad are avoided by adopting a new location for the improved highway about 1,000 feet in length, keeping the highway on the west side of the railroad.

GRIFFINS CORNERS ROAD NO. 36, DELAWARE COUNTY, N. Y.

Length of road, 1.57 miles.

Width of macadam, 12 feet.

Width of roadway, 16 feet.

Engineer's estimate of total cost, \$6,160.

Contract dated, July 18, 1901.

Work started, August, 1901.

Work completed to October 1, 1901, 99.6 per cent.

Contractor, town of Middletown.

Engineer in charge, F. N. Sanders.

This road starts at the west line of Charles Liedman's farm and extends for 1.57 miles through the unincorporated village of Griffins Corners. Both courses of stone and the screenings for the binder are obtained by crushing local bluestone, cobble stones and boulders.

Road No. 36 is a continuation of the Ulster and Delaware turnpike, section 3, in Ulster county, with a short distance between. It is just over the divide between the Hudson River watershed and the Delaware River watershed, on the summit of the Catskill Mountains at this place. It is expected to extend this road about 6 miles farther toward Margaretville.

SAUGERTIES—WOODSTOCK, SECTION 2, No. 38, ULSTER COUNTY, N. Y.

Length of road, 4.9 miles.

Width of macadam, 12 feet.

Width of roadway, 16, 18, 20, 22 and 24 feet.

Engineer's estimate total cost, \$35,520.

Contract dated, May 6, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 37 per cent.

Contractors, Bellew & Merritt Co.

Engineers in charge, L. G. Fenton until September, 1902; after that date, H. C. Titus.

Road No. 38 extends from the old toll road at Klieber's Hotel to the town line of Woodstock where it joins road No. 37. These two roads, with road No. 142 to be built next year, will connect Saugerties with Bearsville about 12 miles westerly. These roads will give those interested in the numerous bluestone quarries, farming, summer homes and boarding houses easy access to the West Shore Railroad and the Hudson River at Saugerties. On road built in 1902 crushed local sandstone or bluestone was used for both courses and sand and local sandstone screenings for binder.

TURNERS-MONROE ROAD No. 46, ORANGE COUNTY, N. Y.

Length of road, 1.59 miles.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$7,690.

Contract dated, June 18, 1901.

Contractors, Board of Supervisors of Orange County.

The plans for road No. 46 provide for a new location to get around a hill near the village of Monroe instead of following the old road over the hill with steep grades on both sides. This road would be of no use unless the village of Monroe built about 400 feet of roadway within its limits, to connect with road No. 46, where it ends at the village line.

Construction of this road has not been started, for the reason that the board of supervisors of Orange county have not acquired the land for the necessary rights of way where the new road deviates from the existing highway.

ARMONK-MT. KISCO ROAD No. 50, WESTCHESTER COUNTY, N. Y.

Length of road, 4.44 miles.

Width of macadam, 12 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$36,062.

Contract dated, July 22, 1901.

Work started, September, 1901.

Work completed to October 1, 1902, 78 per cent.

Contractors, Eldert & Johanknecht.

Engineers in charge, Ralph Russell and L. L. Melius.

The bottom and top courses formed of local granitic rock, the screenings for the bottom course local stone and for the top course half limestone and half local stone.

Road No. 50 forms part of the east side highway across the county, joining road No. 35 on the south and road No. 51 on the north.

MT. KISCO-BEDFORD ROAD No. 51, WESTCHESTER COUNTY, N. Y.

Length of road, 5.04 miles.

Width of macadam, 12 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$40,584.

Contract dated, July 24, 1901.

Work started, August, 1901.

Work completed to October 1, 1902, 99 per cent.

Contractors, Bellew & Merritt Co.

Engineer in charge, Ralph Russell.

The bottom and top courses formed of local granitic rock, the screenings for the bottom course local stone and for the top course half limestone and half local stone.

Road No. 51 forms part of the east side highway across the county, joining road No. 50 on the south.

BRIAR CLIFF MANOR-ECHO LAKE ROAD No. 54, WESTCHESTER
COUNTY, N. Y.

Length of road, 2.65 miles.

Width of macadam, 12 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$22,540.

Contract dated, July 17, 1901.

Work started, April, 1902.

Work completed to October 1, 1902, 98 per cent.

Contractors, McCabe & Duffy.

Engineers in charge, Ralph Russell and F. S. Strong.

Road No. 54 will form part of the west side highway across the county, joining road No. 53 on the south.

The bottom and top courses are built of local granitic rock. The screenings for the bottom course local stone and for the top course half limestone and half local stone.

WINDSOR ROAD No. 57, SECTION 1, CLINTON COUNTY, N. Y.

Length of road, 1 mile.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$7,780.

Contract dated, June 7, 1901.

Work started, September, 1901.

Work completed to October 1, 1902, 99.9 per cent.

Contractor, Prescott & Buckley Construction Company.

Engineer in charge, T. A. Hendrickson.

This road starts at the westerly village line of Rouse's Point and extends westerly toward the village of Champlain, a distance of 1 mile. The bottom and top courses are of local limestone of which the screenings were used for a binder.

WATERFORD—MECHANICVILLE ROAD No. 59, SECTION 2, SARATOGA COUNTY, N. Y.

Length of road, 5.03 miles.

Width of macadam, 16 feet.

Width of roadway, 22 and 28 feet.

Engineer's estimate of total cost, \$36,532.

Contract dated, July 27, 1901.

Work started, June, 1902.

Work completed to October 1, 1902, 36 per cent.

Contractors, E. & J. E. Martin.

Engineer in charge, F. B. Morss.

This road is a continuation of road No. 39. When both roads are completed the main highway on the west side of the Hudson River from Troy and Waterford to the north will be macadamized between Waterford and Mechanicville.

The bottom course is of limestone except between stations 128 and 225, where trap rock was used. Trap rock was used for the top course.

WALDEN—SCOTT'S CORNERS ROAD No. 64, ORANGE COUNTY, N. Y.

Length of road, 1.84 miles.

Width of gravel, 12 feet.

Width of roadway, 22 feet.

Engineer's estimate total cost, \$5,640.

Contract dated, June 20, 1902.

Work started, July, 1902.

Work completed to October 1, 1902, 91 per cent.

Contractors, Board of Supervisors.

Engineer in charge, C. H. MacCulloch.

Road No. 64 connects the village of Walden with Road No. 43 (the Cohecton Turnpike) at Scott's Corners, where a good road is available to Newburg or Montgomery.

Local gravel was used to form a surface six inches thick after rolling.

MONTGOMERY-GOSHEN ROAD No. 65, ORANGE COUNTY, N. Y.

Length of road, 7.95 miles.

Width of gravel or shale, 12 feet; and broken stone, 8 feet.

Width of roadway, 22 feet.

Engineer's estimate total cost, \$38,160.

Contract dated, June 20, 1902.

Work started, July, 1902.

Work completed to October 1, 1902, 23 per cent.

Contractors, Board of Supervisors.

Engineer in charge, F. M. Williams.

Road No. 65 connects Goshen, the county seat of Orange county, with Montgomery. It joins the Newburg-Campbell Hall Road at Campbell Hall, and the Newburg-Montgomery Road at Montgomery. Local gravel and shale is used to form a surface six inches thick after rolling.

QUAKER STREET (SECTION 1) ROAD No. 73, SCHENECTADY COUNTY, N. Y.

Length of road, 1.18 miles.

Width of macadam, 12 and 16 feet.

Width of roadway, 18 and 22 feet.

Engineer's estimate, total cost, \$15,993.

Contract dated, May 17, 1902.

Work started, July, 1902.

Work completed to October 1, 1902, 43 per cent.

Contractors, Snell Brothers.

Engineers in charge, F. B. Morss and Inspector F. H. Owens.

Road No. 73 connects the village of Quaker street with the

Delaware and Hudson Railroad station, at Delanson. On road built in 1902, Schoharie limestone was used for both courses and Schoharie limestone screenings for binder.

ALBIA-WYNANTSKILL ROAD No. 77, RENSSELAER COUNTY, N. Y.

Length of road, 1.50 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate, total cost, \$12,180.

Contract dated, May, 1902.

Work started, July, 1902.

Work completed to October 1, 1902, 64 per cent.

Contractor, Harry L. Smith.

Engineer in charge, James T. Brady.

Road No. 77 connects Troy with the village of Wynantskill, and the farming country southeast of Troy. Roads have been approved extending this road to Poestenkill and West Sand Lake. In the spring of the year the greater portion of this road has always been impassable on account of the poor drainage and the unstable soil on which it is built.

Crushed local fieldstone were used for both courses, and sand and local fieldstone screenings for binder.

TROY AND BRUNSWICK (SECTION 3) ROAD No. 84, RENSSELAER COUNTY, N. Y.

Length of road, 2.46 miles.

Width of macadam, 15 feet.

Width of roadway, 22 feet.

Engineer's estimate, total cost, \$19,340.

Contract dated, May 12, 1902.

Work started, July, 1902.

Work completed to October 1, 1902, 39 per cent.

Contractors, Bellew & Merritt Co.

Engineer in charge, R. J. Marcher.

Road No. 84 extends roads Nos. 10 and 25 to Haynerville, about six miles northeast of Troy on the main road to Vermont and northern New England States.

Crushed local quartzite were used for both courses and sandy loam and local quartzite screenings for binder.

**FORT EDWARD AND SANDY HILL ROAD No. 85, WASHINGTON
COUNTY, N. Y.**

Length of road, .92 mile.

Width of macadam, 18 feet.

Width of roadway, 22 feet.

Engineer's estimate, total cost, \$8,480.

Contract dated, May 12, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 95 per cent.

Contractors, Bellew & Merritt Co.

Engineers in charge, F. B. Morss and F. H. Owens.

Road No. 85 connects the incorporated villages of Fort Edward and Sandy Hill and passes the Washington County Fair Grounds. There was a scarcity of gravel to form the shoulders, and the two-inch surface-layer of crushed stone was therefore extended over these, forming a crushed-stone surface for the full width between ditches and producing a very fine effect without greater cost.

Crushed local limestone was used for both courses and sand and local limestone screenings for binder.

**GRASSY POINT-SHERWOOD'S BRIDGE ROAD No. 90, ROCKLAND
COUNTY, N. Y.**

Length of road, 2.83 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate, total cost, \$24,100.

Contract dated, May 12, 1902.

Work started, September, 1902.

Work completed to October 1, 1902, 1 per cent.

Contractors, Bellew & Merritt Co.

Engineer in charge, J. C. Patrick.

Road No. 90 extends from near the West Shore Railroad, near Grassy Point, westerly 2.82 miles. It is hoped that this road

will be extended across Rockland county and a portion of Orange county to Tuxedo Park, connecting the valley of the Ramapo River with the Hudson River. No stone was laid on this road this year.

NYACK TURNPIKE (SECTION 1) ROAD NO. 91, ROCKLAND COUNTY,
N. Y.

Length of road, 3.90 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$29,990.

Contract dated, May 20, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 21 per cent.

Contractors, Eldert, Johanknecht & Co.

Engineer in charge, O. J. Dempster.

Road No. 91 starts at the northerly village line of Hilburn and extends northerly up the valley of the Ramapo River to the Orange county line. As the southerly village line of Suffern is but a short distance from the New Jersey line, this road, with others built and projected in Orange, Ulster, Albany, Saratoga and other counties, will form the southerly end of a good road from New Jersey northerly to Newburg, Kingston, Saugerties, Albany, Cohoes, Mechanicville and other points along the Hudson River.

Crushed local granitic rock was used for both courses and sand and local granitic screenings for binder.

DELMAR-SLINGERLANDS ROAD NO. 92, ALBANY COUNTY, N. Y.

Length of road, 1.74 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$17,630.

Contract dated, May 12, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 33 per cent.

Contractors, Bellevue & Merritt Co.

Engineers in charge, J. C. Patrick and P. D. Wendell, until September 18; after that date, T. A. Hendrickson.

Road No. 92 connects road No. 41 at Delmar with the old New Scotland plank-road at Slingerlands.

Helderberg limestone was used for both courses and sand and limestone screenings for binder.

FLORIDA-WARWICK ROAD No. 93, ORANGE COUNTY, N. Y.

Length of road, 4.67 miles.

Width of gravel or shale, 12 feet, and broken stone, 8 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$29,450.

Contract dated, June 20, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 53 per cent.

Contractors, Board of Supervisors.

Engineer in charge, F. M. Williams and L. Olmstead.

Road No. 93, with road No. 44, connects the county seat at Goshen with the attractive villages of Florida and Warwick, on the south. Between Florida and Warwick the road is on a new location for about one and one-half miles, of which there are two views accompanying this report. This location avoids a long, steep hill that could not be cut down to the grade obtained on the new location at any reasonable cost.

MIDDLETOWN-GOSHEN ROAD No. 95, ORANGE COUNTY, N. Y.

Length of road, 5.86 miles.

Width of gravel, 12 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$29,710.

Contract dated, June 20, 1902.

Work started, July, 1902.

Work completed to October 1, 1902, 30 per cent.

Contractor, Board of Supervisors.

Engineers in charge, F. M. Williams and W. M. Payne.

Road No. 95 connects the county seat at Goshen with the city

of Middletown and gives the farming and dairying interests of the Wallkill Valley in the vicinity of this road better access to Middletown and Goshen.

SHUNPIKE ROAD No. 97, WASHINGTON COUNTY, N. Y.

Length of road, 3.61 miles.

Width of macadam, 12 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$26,075.

Contract dated, May 12, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 37 per cent.

Contractors, Bellew & Merritt Co.

Engineer in charge, S. W. Belding.

Road No. 97 starts at the village of Cambridge and extends southerly 3.61 miles toward Eagle Bridge on the Fitchburg Railroad. Two dangerous grade crossings on the D. and H. Railroad are avoided by adopting a new location for the improved highway for a short distance, keeping the new highway on the easterly side of the railroad.

Crushed local quartzite were used for both courses and sand and local quartzite screenings for binder.

BARRICK ROAD No. 102, RENSSELAER COUNTY, N. Y.

Length of road, 2.05 miles.

Width of macadam, 8 and 12 feet.

Width of roadway, 16 and 22 feet.

Engineer's estimate of total cost, \$19,575.

Contract dated, May 26, 1902.

Contractor, James R. Williams.

Engineer in charge, Perry Filkin.

Road No. 102 starts at the city line of Rensselaer, opposite Albany, and extends easterly about two miles until it intersects the proposed extension of road No. 26, southerly at Couse.

Crushed Hudson River trap rock was used for both courses with sand as binder for the base and trap rock screenings as binder for the top.

GRANVILLE—MIDDLE GRANVILLE ROAD NO. 103, WASHINGTON
COUNTY, N. Y.

Length of road, 1.31 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$10,175.

Contract dated, May 7, 1902.

Work started, August, 1902.

Work completed to October 1, 1902, 60 per cent.

Contractor, William A. Burnham.

Engineer in charge, B. J. Cornell.

Road No. 103 connects the villages of Granville and Middle Granville.

Crushed local quartzite rock was used in both courses, and local quartzite screenings for binder.

QUAKER STREET (SECTION 2) ROAD NO. 105, SCHENECTADY
COUNTY, N. Y.

Length of road, .349 mile.

Width of macadam, 14 and 16 feet.

Width of roadway, 18 and 22 feet.

Engineer's estimate of total cost, \$2,460.

Contract dated, May 17, 1902.

Work started, September, 1902.

Work completed to October 1, 1902, 10 per cent.

Contractors, Snell Brothers.

Engineers in charge, F. B. Morss and F. H. Owens.

Schoharie limestone was used in both courses, of which the screenings was used for binder.

QUAKER STREET (SECTION 3) ROAD NO. 106, SCHENECTADY
COUNTY, N. Y.

Length of road, .132 mile.

Width of macadam, 14 and 16 feet.

Width of roadway, 18 and 22 feet.

Engineer's estimate of total cost, \$1,225.

Contract dated, May 17, 1902.

Contractors, Snell Brothers.

Engineers in charge, F. B. Morss and F. H. Owens.

Schoharie limestone was used for both courses and limestone screenings for binder.

Work on this road was not begun until after the close of the fiscal year.

FULTONVILLE—GLEN ROAD No. 107, MONTGOMERY COUNTY, N. Y.

Length of road, 3.66 miles.

Width of macadam, 14 and 16 feet.

Width of roadway, 17, 20 and 22 feet.

Engineer's estimate of total cost, \$36,940.

Contract dated, May 12, 1902.

Work started, July, 1902.

Work completed to October 1, 1902, 23 per cent.

Contractors, Bellew & Merritt Co.

Engineers in charge, H. W. DeGraff and C. H. Fosdick.

Road No. 107 starts at the village of Fultonville on the Mohawk river, West Shore Railroad and Erie Canal, and extends southerly to the village of Glen. It will afford the farming interests of the Mohawk Valley south of Fultonville much better access to that village.

On road built in 1902 crushed local fieldstone was used for both courses, and sand and local fieldstone screenings for binder.

WEST MOHAWK RIVER ROAD No. 108, MONTGOMERY COUNTY, N. Y.

Length of road, 3.25 miles.

Width of macadam, 14 and 16 feet.

Width of roadway, 20 and 22 feet.

Engineer's estimate of total cost, \$31,400.

Contract dated, May 12, 1902.

Work started, September, 1902.

Work completed October 1, 1902, 2 per cent.

Contractors, Bellew & Merritt Co.

Engineers in charge, H. W. DeGraff and H. E. Poole.

Road No. 108 extends from the westerly city line of Amsterdam up the Mohawk Valley to the village of Tribe's Hill. It is expected that this road, with others that are approved and projected, will form an improved highway up the Mohawk Valley and ultimately across the State from Albany to Buffalo. No stone has yet been crushed for this road.

ARGERSINGER ROAD NO. 109, FULTON COUNTY, N. Y.

Length of road, 2.30 miles.

Width of macadam, 14 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$17,780.

Contract dated, May 20, 1902.

Contractors, Mott & Kemper.

Road No. 109 was not started on September 30, 1902.

BRIGGS ROAD NO. 110, FULTON COUNTY, N. Y.

Length of road, 2.25 miles.

Width of macadam, 14 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$17,400.

Contract dated, May 20, 1902.

Contractors, Mott & Kemper.

Road No. 110 was not started on September 30, 1902.

COCHECTON TURNPIKE (SECTION 1) ROAD NO. 113, ORANGE COUNTY, N. Y.

Length of road, 2.29 miles.

Width of broken stone, 12 feet, of which none has yet been laid.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$20,740.

Contract dated, June 20, 1902.

Work started, July, 1902.

Work completed to October 1, 1902, 36 per cent.

Contractors, Board of Supervisors.

Engineer in charge, C. H. MacCulloch.

Road No. 113 connects the village of Montgomery and road No. 43 with Newburg. There were several very steep hills coming out of the Hudson River valley from Newburg. These made necessary several heavy cuts and fills to get the required six per cent grade.

MIDDLETOWN-PINE BUSH (SECTION 2) ROAD NO. 114, ORANGE COUNTY, N. Y.

Length of road, 1.21 miles.

Width of shale, 12 feet.

Width of roadway, 16 feet.

Engineer's estimate of total cost, \$4,120.

Contract dated, June 20, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 93 per cent.

Contractors, Board of Supervisors.

Engineer in charge, F. M. Williams.

Road No. 114 connects road No. 45 with the old Bloomingburg Toll road near Crawford Junction, thus affording a good road from Pine Bush to Middletown.

CENTRAL VALLEY-TURNERS ROAD NO. 115, ORANGE COUNTY, N. Y.

Length of road, 2.62 miles.

Width of gravel, 16 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$19,750.

Contract dated, June 20, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 71 per cent.

Contractors, Board of Supervisors.

Engineers in charge, F. M. Williams and H. E. Breed.

Road No. 115 connects the existing and proposed improved system of roads extending from Suffern, near the New Jersey line, across Rockland and Orange counties, westerly to Port

Jervis, with the existing and proposed improved road northerly to Newburg and up the valley of the Hudson River. It is expected that road No. 115 will cross under the main line tracks of the Erie Railroad near Turners at some future date.

KINGSTON-RIFTON ROAD, No. 116A, ULSTER COUNTY, N. Y.

Length of road, 4.18 miles.

Width of macadam, 14 feet.

Width of roadway, 18 and 20 feet.

Engineer's estimate of total cost, \$43,650.

Contract dated, May 19, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 48 per cent.

Contractors, Town Board of town of Esopus.

Engineer in charge, George H. Penfield.

KINGSTON-RIFTON ROAD, No. 116B, ULSTER COUNTY, N. Y.

Length of road, .89 mile.

Width of macadam, 14 feet.

Width of roadway, 18 and 20 feet.

Engineer's estimate of total cost, \$9,050.

Contract dated, May 19, 1902.

Contractors, Town Board of town of Ulster.

On portion of road nearest Rifton, built in 1902, crushed local sandstone ("bluestone") was used for both courses, and sand, local sandstone screenings and limestone screenings for binder.

Road No. 116 starts at the city line of Kingston and extends southerly along the valley of the Rondout Creek to the village of Rifton. The manufacturing interests at Rifton and St. Remey, and the farming interests adjacent to this road will be greatly benefited by this improved highway to tidewater at Kingston.

ULSTER AND DELAWARE (SECTION 2) ROAD, No. 117, ULSTER COUNTY, N. Y.

Length of road, 5.09 miles.

Width of macadam, 12 and 14 feet.

Width of roadway, 20 and 22 feet.

Engineer's estimate of total cost, \$54,200.

Contract dated, May 15, 1902.

Work started, May, 1902.

Work completed to October 1, 1902, 18 per cent.

Contractors, Town Board town of Shandaken.

Engineer in charge, F. N. Sanders.

Road No. 117 connects road No. 16 at Phoenicia with road No. 31 near Shandaken. These three roads will form one of the most delightful drives in the State through the valley of the Esopus Creek, in the Catskill Mountains, with nearly twenty miles of macadam roadway, whose maximum grades do not exceed three per cent, with the exception of one or two short lengths of five per cent.

Crushed local sandstone (or "bluestone") was used for both courses, of which the screenings were used for binder.

SHANDAKEN-HURLEY ROAD, No. 118, ULSTER COUNTY, N. Y. .

Length of road, 4 miles.

Width of macadam, 14 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$35,350.

Contract dated, May 20, 1902.

Work started, September, 1902.

Work completed to October 1, 1902, 5 per cent.

Contractors, Eldert, Johanknecht & Co.

Engineer in charge, F. N. Sanders.

Road No. 118 forms part of the old Ulster and Delaware turnpike, extending from the village of Shokan, the "Gateway of the Catskills," four miles towards Kingston to the town line of West Hurley. It is expected that the old turnpike will be improved to the city of Kingston in the course of a few years after the toll road becomes a public highway. No stone has yet been laid.

LOUDON (SECTION 2) ROAD, No. 119, ALBANY COUNTY, N. Y.

Length of road, 3.92 miles.

Width of macadam, 16 feet.

Width of roadway, 22 feet.

Engineer's estimate of total cost, \$38,800.

Contract dated, July 25, 1902.

Work started, September, 1902.

Work completed to October 1, 1902, 2 per cent.

Contractor, Thomas H. Karr.

Engineer in charge, R. Russell.

Road No. 119 is an extension of road No. 22 and when completed the two roads will form a fine macadam highway from the city line of Albany to the city line of Cohoes, overlooking the Hudson River. No stone has yet been laid.

CANAJOHARIE-SHARON SPRINGS ROAD, No. 120, MONTGOMERY COUNTY, N. Y.

Length of road, 4.14 miles.

Width of macadam, 14 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$38,950.

Contract dated, May 22, 1902.

Work started, August, 1902.

Work completed to October 1, 1902, 20 per cent.

Contractor, Joseph Walker.

Engineer in charge, Charles A. Sullivan.

Road No. 120 extends from the village of Canajoharie about four miles southerly toward Sharon Springs. This road will afford the farming and hop-growing interests of the Mohawk Valley south of Canajoharie a greatly improved outlet to their market.

Crushed local fieldstone was used for both courses and local fieldstone screenings for binder.

NORTH ROAD No. 124, ALBANY COUNTY, N. Y.

Length of road, 1.84 miles.

Width of macadam, 14 feet.

Width of roadway, 20 feet.

Engineer's estimate of total cost, \$14,500.

Contract dated May 12, 1902.

Work started, June, 1902.

Work completed to October 1, 1902, 99.9 per cent.

Contractors, Bellew & Merritt Co.

Engineers in charge, J. C. Patrick and P. D. Wendell.

Road No. 124 will connect the village of Voorheesville with the New Scotland plank-road near New Scotland.

Broken local fieldstone and Schoharie limestone was used in bottom course and Schoharie limestone for top course. Sand and Schoharie limestone screenings were used for binder.

IMPROVEMENT PUBLIC HIGHWAYS.

Recapitulation of Work Done to September 30, 1902.

| COUNTY. | Miles under contract during year ending September 30, 1902. | Miles of plans and estimates completed prior to September 30, 1901. | Miles of plans and estimates completed prior to September 30, 1902. | Miles of plans and estimates completed during year ending September 30, 1902. | Miles of surveys made during year ending September 30, 1902. | Miles of contracts completed prior to September 30, 1901. | Miles of contracts completed prior to September 30, 1902. | Miles of contracts completed during year ending September 30, 1902. |
|--|---|---|---|---|--|---|---|---|
| Albany..... | 14.69 | 8.93 | 55.692 | 46.762 | 62.696 | ..... | 7.19 | 7.19 |
| Clinton..... | 3.82 | 16.27 | 22.84 | 6.57 | 7.5 | ..... | 2.82 | 2.82 |
| Columbia..... | ..... | 1.13 | 1.13 | ..... | ..... | 1.13 | 1.13 | ..... |
| Delaware..... | 1.57 | 2.57 | 13.68 | 11.11 | 12.11 | ..... | ..... | ..... |
| Dutchess..... | ..... | 3.29 | 10.64 | 7.35 | 7.36 | ..... | ..... | ..... |
| Fulton..... | 8.59 | 8.59 | 8.59 | ..... | 11.84 | ..... | ..... | ..... |
| Herkimer..... | 1.11 | 3.00 | 6.93 | 3.93 | ..... | ..... | ..... | ..... |
| Montgomery..... | 14.344 | 10.10 | 22.844 | 12.764 | 15.39 | ..... | 3.294 | 3.294 |
| Orange..... | 60.05 | 56.22 | 112.03 | 55.81 | 66.56 | ..... | 32.02 | 32.02 |
| Otsego..... | ..... | 1.39 | 3.55 | 2.16 | 1.93 | ..... | ..... | ..... |
| Putnam..... | ..... | 1.15 | 14.141 | 12.991 | 26.10 | ..... | ..... | ..... |
| Rensselaer..... | 14.80 | 16.83 | 43.54 | 26.71 | 28.04 | 2.03 | 7.77 | 5.74 |
| Rockland..... | 6.73 | 11.09 | 11.09 | ..... | ..... | ..... | ..... | ..... |
| Saratoga..... | 12.60 | 12.60 | 16.73 | 4.13 | 4.00 | ..... | 7.57 | 7.57 |
| Schenectady..... | 1.661 | 4.66 | 8.721 | 4.061 | 15.87 | 2.00 | 2.00 | ..... |
| Ulster..... | 28.78 | 25.37 | 44.11 | 18.74 | 64.41 | 5.66 | 9.66 | 4.00 |
| Warren..... | ..... | ..... | 0.66 | 0.66 | 1.10 | ..... | ..... | ..... |
| Washington..... | 7.09 | 7.09 | 8.77 | 1.68 | 2.97 | ..... | 1.25 | 1.25 |
| Westchester..... | 33.18 | 59.96 | 60.85 | 0.89 | 4.00 | ..... | 21.05 | 21.05 |
| Total miles and decimals of miles..... | 209.015 | 250.24 | 466.558 | 216.318 | 331.876 | 10.82 | 95.754 | 84.934 |

I desire to urge the enactment of a State law preventing the use of narrow tires on wagons drawing heavy loads over all roads improved by State aid. Many of the improved roads have been seriously damaged during the past year by heavy loads on narrow tires, and as the mileage of improved roads increase this damage will become more extensive unless there be an effective State law that can be enforced by some State official.

This division has, during the past year, been under the direction of the writer and William B. Landreth, Resident Engineer. All of the employes of the Department have shown their readiness to perform their full duty on all occasions.

A statement of the engineering expenses of the Division is hereto annexed, showing in detail the names of persons employed, time of service and compensation of each.

Very respectfully,

H. A. VAN ALSTYNE,

Division Engineer.

EASTERN DIVISION: CANALS.

267

Ordinary Repairs—Erie Canal.

(Chapter 418, Laws 1900; chapter 644, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|--|----------------------|-----------------|-----------------------|------------|---------|------------|
| H. A. Van Alstyne.... | Division engineer.. | ... | \$3,000 per yr. | \$1,833 37 | \$2 12 | \$1,835 49 |
| H. A. Van Alstyne.... | Resident engineer.. | ... | 2,400 per yr. | 133 33 | | 133 33 |
| Wm. B. Landreth.... | Resident engineer.. | ... | 2,400 per yr. | 666 65 | 6 32 | 672 97 |
| Lydia A. Leutze, ex-
ecutrix T. C. Leutze | Division engineer.. | ... | 3,000 per yr. | 166 67 | | 166 67 |
| W. J. Valteau..... | Financial clerk.... | ... | 2,100 per yr. | 1,165 27 | 20 | 1,165 47 |
| Thomas F. Kelly.... | Stenographer..... | ... | 900 per yr. | 300 00 | | 300 00 |
| Nelle Clark..... | Stenographer..... | ... | 900 per yr. | 105 00 | | 105 00 |
| A. M. Evans..... | Assistant engineer.. | 37 | 5 00 per day | 185 00 | | 185 00 |
| R. S. Greenman.... | Leveller..... | 269 | 4 50 per day | 1,210 50 | 7 30 | 1,217 80 |
| L. G. Fenton..... | Leveller..... | 4 | 4 50 per day | 18 00 | | 18 00 |
| John A. O'Connor... | Draftsman..... | 18 | 5 00 per day | 90 00 | | 90 00 |
| W. E. Conklin..... | Rodman..... | 6 | 3 50 per day | 21 00 | | 21 00 |
| H. J. Richardson... | Rodman..... | 49 | 3 50 per day | 171 50 | 1 40 | 172 90 |
| Wm. B. Strong.... | Chainman..... | 224 | 3 00 per day | 672 00 | | 672 00 |
| George McDonald... | Chainman..... | 21 | 3 00 per day | 63 00 | 20 | 63 20 |
| Dwight B. La Du.... | Chainman..... | 24 | 3 00 per day | 72 00 | | 72 00 |
| <i>Incidental Expenses.</i> | | | | | | \$6,890 83 |
| Stationary..... | | | | \$266 22 | | |
| Livery..... | | | | 1 33 | | |
| Postage..... | | | | 78 04 | | |
| Telegraph and telephone.. | | | | 126 16 | | |
| Miscellaneous..... | | | | 1,345 63 | | |
| Total..... | | | | | | \$8,708 21 |

Ordinary Repairs—Champlain Canal.

(Chapter 418, Laws 1900; chapter 644, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|--|----------------------|-----------------|-----------------------|----------|---------|------------|
| H. A. Van Alstyne.... | Division engineer.. | ... | \$3,000 per yr. | \$916 63 | 1 06 | \$917 69 |
| H. A. Van Alstyne.... | Resident engineer.. | ... | 2,400 per yr. | 66 67 | | 66 67 |
| Wm. B. Landreth.... | Resident engineer.. | ... | 2,400 per yr. | 333 35 | 3 16 | 336 51 |
| Lydia A. Leutze, ex-
ecutrix T. C. Leutze | Division engineer.. | ... | 3,000 per yr. | 83 33 | | 83 33 |
| W. J. Valteau..... | Financial clerk.... | ... | 2,100 per yr. | 527 81 | 50 | 528 31 |
| Thomas F. Kelly.... | Stenographer..... | ... | 900 per yr. | 150 00 | | 150 00 |
| Nelle Clark..... | Stenographer..... | ... | 900 per yr. | 300 00 | | 300 00 |
| A. M. Evans..... | Assistant engineer.. | 18 | 5 00 per day | 90 00 | | 90 00 |
| John A. O'Connor... | Draftsman..... | 9 | 5 00 per day | 45 00 | | 45 00 |
| R. S. Greenman.... | Leveller..... | 50 | 4 50 per day | 225 00 | | 225 00 |
| L. G. Fenton..... | Leveller..... | 2 | 4 50 per day | 9 00 | | 9 00 |
| Perry Filkin..... | Leveller..... | 4 | 4 50 per day | 18 00 | | 18 00 |
| H. J. Richardson... | Rodman..... | 126 | 3 50 per day | 441 00 | 2 20 | 443 20 |
| W. B. Strong.... | Chainman..... | 81 | 3 00 per day | 243 00 | | 243 00 |
| George McDonald... | Chainman..... | 71 | 3 00 per day | 213 00 | 1 00 | 214 00 |
| Harry G. Stutz.... | Laborer..... | 6 | 2 00 per day | 12 00 | | 12 00 |
| John F. Higgins.... | Stenographer..... | 17 | 3 00 per day | 51 00 | | 51 00 |
| <i>Incidental Expenses.</i> | | | | | | \$3,732 71 |
| Stationary and printing.. | | | | \$77 56 | | |
| Livery..... | | | | 67 | | |
| Postage..... | | | | 38 67 | | |
| Telegraph and telephone.. | | | | 65 41 | | |
| Miscellaneous..... | | | | 436 88 | | |
| Total..... | | | | | | \$4,351 90 |

Removing Obstructions — Bond and Wood Creeks — Champlain Canal.

(Chapter 683, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------|---------------------|-----------------|-----------------------|---------|---------|----------|
| Foster B. Morse..... | Assistant engineer. | 16 | \$5 00 per day | \$80 00 | ..... | \$80 00 |
| John A. O'Connor..... | Draftsman..... | 14 | 4 50 per day | 63 00 | ..... | 63 00 |
| Frank Roberts..... | Rodman..... | 21 | 3 50 per day | 73 50 | ..... | 73 50 |
| J. C. Patrick..... | Rodman..... | 11 | 2 50 per day | 28 50 | ..... | 28 50 |
| L. L. Melius..... | Chainman..... | 16 | 3 00 per day | 45 00 | ..... | 45 00 |
| Total..... | | | | | | \$390 00 |

Bridge Near Burton's Saw Mill — Waterford — Champlain Canal.

(Chapter 629, Laws 1898; chapter 219, Laws 1899; chapter 443, Laws 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------|-------------------------------|-----------------|-----------------------|---------|---------|---------|
| C. T. Middlebrook ... | First assistant engineer..... | 16 | \$6 00 per day | \$96 00 | ..... | \$96 00 |

Green's Bridge, Glens Falls Feeder — Champlain Canal.

(Chapter 423, Laws of 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|-----------------------|-----------------|-----------------------|---------|---------|----------|
| Wm. B. Landreth... | Resident engineer... | ..... | ..... | ..... | \$23 80 | \$23 80 |
| John R. Kaley..... | Assistant engineer... | 19 | \$5 00 per day | \$95 00 | 25 31 | 120 31 |
| W. J. Gilmour..... | Rodman..... | 116 | 3 50 per day | 406 00 | 4 61 | 410 61 |
| | | | | | | \$554 72 |
| <i>Incidental Expenses.</i> | | | | | | |
| Stationary and printing..... | | | | | \$6 30 | |
| Livery | | | | | 14 50 | |
| Postage | | | | | 30 | |
| Miscellaneous | | | | | 23 56 | |
| | | | | | | 44 86 |
| Total..... | | | | | | \$599 38 |

Bridge, Fulton Street, Waterford—Champlain Canal.

(Chapter 697, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|----------|---------|----------|
| Wm. B. Landreth... | Resident engineer.. | ... | \$2,400 per yr. | \$103 23 | \$1 40 | \$104 63 |
| John R. Kaley..... | Assistant engineer.. | 12 | 5 00 per day | 60 00 | 1 50 | 61 50 |
| F. N. Sanders..... | Leveler..... | 13 | 4 50 per day | 58 50 | 4 00 | 62 50 |
| Clark Brown..... | Leveler..... | 20 | 4 50 per day | 90 00 | ..... | 90 00 |
| Ralph Russell..... | Leveler..... | 54 | 4 50 per day | 243 00 | 1 60 | 244 60 |
| John A. O'Connor... | Draftsman..... | 10 | 4 50 per day | 45 00 | ..... | 45 00 |
| L. L. Melius..... | Chainman..... | 33 | 3 00 per day | 99 00 | 10 00 | 109 00 |
| Henry D. Tefft..... | Laborer..... | 17 | 2 00 per day | 34 00 | 2 10 | 36 10 |
| John S. Heath..... | Laborer..... | 27 | 2 00 per day | 54 00 | ..... | 54 00 |
| Harry Poole..... | Laborer..... | 15 | 2 00 per day | 30 00 | 4 30 | 34 30 |
| <i>Incidental Expenses.</i> | | | | | | \$841 63 |
| Stationary and printing..... | | | | | \$7 46 | |
| Telephone and telegraph..... | | | | | 40 | |
| Miscellaneous..... | | | | | 15 20 | |
| | | | | | | 23 06 |
| Total..... | | | | | | \$864 69 |

Bridge Over Champlain Canal, Ontario Street, Cohoes.

(Chapter 613, Laws 1899; chapter 682, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Trav. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|--------|------------|
| Wm. B. Landreth... | Resident engineer.. | ... | \$2,400 per yr. | \$96 77 | ..... | \$96 77 |
| John R. Kaley..... | Assistant engineer.. | 114 | 5 00 per day | 570 00 | 14 60 | 584 60 |
| Clark Brown..... | Assistant engineer.. | 10 | 5 00 per day | 50 00 | ..... | 50 00 |
| F. N. Sanders..... | Leveler..... | 37 | 4 50 per day | 166 50 | 8 70 | 175 20 |
| Perry Filkin..... | Leveler..... | 7 | 4 50 per day | 31 50 | ..... | 31 50 |
| H. W. DeGraff..... | Leveler..... | 12 | 4 50 per day | 54 00 | ..... | 54 00 |
| L. L. Melius..... | Chainman..... | 18 | 3 00 per day | 54 00 | 6 52 | 60 52 |
| Esra G. Hollenbeck.. | Laborer..... | 5 | 2 00 per day | 10 00 | 4 00 | 14 00 |
| Henry D. Tefft..... | Laborer..... | 16 | 2 00 per day | 32 00 | 5 55 | 37 55 |
| W. H. Breen..... | Laborer..... | 15 | 2 00 per day | 30 00 | ..... | 30 00 |
| W. Hayes..... | Laborer..... | 5 | 2 00 per day | 10 00 | ..... | 10 00 |
| Henry S. Wells..... | Laborer..... | 5 | 2 00 per day | 10 00 | ..... | 10 00 |
| <i>Incidental Expenses.</i> | | | | | | \$1,154 14 |
| Telegraph and telephone..... | | | | | \$0 67 | |
| Miscellaneous..... | | | | | 94 | |
| | | | | | | 1 61 |
| Total..... | | | | | | \$1,155 75 |

Bridge—Rexford Flats—Erie Canal.

(Chapter 693, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|----------|
| H. A. Van Alstyne... | Division engineer... | | | | \$1 98 | \$1 98 |
| John R. Kaley..... | Assistant engineer.. | 13 | \$5 00 per day | \$65 00 | 19 14 | 84 14 |
| T. A. Hendrickson... | Leveler..... | 135 | 4 50 per day | 607 50 | 29 11 | 636 66 |
| Perry Filkin..... | Leveler..... | 9 | 4 50 per day | 40 50 | 9 51 | 50 02 |
| Jesse C. Patrick..... | Rodman..... | 6 | 3 50 per day | 21 00 | 10 88 | 31 88 |
| George McDonald..... | Chainman..... | 3 | 3 00 per day | 9 00 | 2 36 | 11 36 |
| F. L. Fonda..... | Chainman..... | 1 | 3 00 per day | 3 00 | | 3 00 |
| Henry D. Tefft..... | Laborer..... | 2 | 2 00 per day | 4 00 | 2 12 | 6 12 |
| <i>Incidental Expenses.</i> | | | | | | \$825 16 |
| Printing and stationary..... | | | | | \$7 11 | |
| Telegraph and telephone..... | | | | | 7 10 | |
| Postage..... | | | | | 76 | |
| Miscellaneous..... | | | | | 29 87 | |
| Total..... | | | | | | \$870 00 |

Bridge over Otsquago Creek, Montgomery County--Erie Canal.

(Chapter 468, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|---------|
| John R. Kaley..... | Assistant engineer.. | 2 | \$5 00 per day | \$10 00 | \$8 58 | \$18 58 |
| <i>Incidental Expenses.</i> | | | | | | |
| Stationary and printing..... | | | | | \$7 81 | |
| Total..... | | | | | | \$26 39 |

Improvement Dry River, 14th Street, Watervliet.

(Chapter 472, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|---------|
| John R. Kaley..... | Assistant engineer.. | 10 | \$5 00 per day | \$50 00 | \$4 36 | \$54 36 |
| George McDonald.... | Chainman..... | 11 | 3 00 per day | 33 00 | | 33 00 |
| <i>Incidental Expenses.</i> | | | | | | \$87 36 |
| Stationary and printing..... | | | | | \$7 55 | |
| Miscellaneous..... | | | | | 1 00 | |
| Total..... | | | | | | \$95 91 |

Barge Canal Survey—Head Office Payments.

(Chapter 411, Laws 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|--|--------------------------------|-----------------|-----------------------|------------|----------|------------|
| Wm. B. Landreth..... | Special resident engineer..... | ..... | \$225 per mo. | \$425 00 | \$484 83 | \$909 83 |
| Foster B. Morris..... | Assistant engineer | 49 | 5 00 per day | 240 00 | ..... | 240 00 |
| John R. Kaley..... | Assistant engineer | 33 | 5 00 per day | 165 00 | ..... | 165 00 |
| Clark Brown..... | Assistant engineer | 39 | 5 00 per day | 195 00 | ..... | 195 00 |
| A. E. Broenniman..... | Expert computer. | 44 | 10 00 per day | 440 00 | 9 40 | 449 40 |
| D. B. LaDu..... | Expert computer.. | 101 | 3 50 per day | 353 50 | ..... | 353 50 |
| John A. O'Connor..... | Draftsman..... | 13 | 5 00 per day | 65 00 | ..... | 65 00 |
| Clark Brown..... | Leveler..... | 143 | 4 50 per day | 643 50 | ..... | 643 50 |
| H. P. Willis..... | Leveler..... | 35 | 4 50 per day | 157 50 | 45 90 | 203 40 |
| Perry Filkin..... | Leveler..... | 36 | 4 50 per day | 162 00 | ..... | 162 00 |
| F. N. Sanders..... | Leveler..... | 21 | 4 50 per day | 94 50 | ..... | 94 50 |
| Fred S. Strong..... | Leveler..... | 40 | 4 50 per day | 180 00 | ..... | 180 00 |
| George D. Williams | Leveler..... | 26 | 4 50 per day | 117 00 | ..... | 117 00 |
| Frank M. Williams.. | Leveler..... | 26 | 4 50 per day | 117 00 | ..... | 117 00 |
| O. J. Demster..... | Leveler..... | 5 | 4 50 per day | 22 00 | ..... | 22 50 |
| C. H. McCulloch..... | Rodman..... | 26 | 3 50 per day | 91 00 | ..... | 91 00 |
| Frank Roberts..... | Rodman..... | 10 | 3 50 per day | 35 00 | ..... | 35 00 |
| F. L. Fonda..... | Chainman..... | 113 | 3 00 per day | 339 00 | ..... | 339 00 |
| E. J. Greiner..... | Chainman..... | 59 | 2 50 per day | 147 50 | 4 50 | 152 00 |
| George McDonald..... | Chainman..... | 13 | 3 00 per day | 39 00 | ..... | 39 00 |
| D. B. LaDu..... | Laborer..... | 61 | 2 00 per day | 122 00 | ..... | 122 00 |
| Esra G. Hollenbeck.. | Laborer..... | 156 | 2 00 per day | 312 00 | ..... | 312 00 |
| F. McEwan Pruyn..... | Laborer..... | 10 | 2 00 per day | 20 00 | ..... | 20 00 |
| C. H. Fostlick..... | Laborer..... | 5 | 2 00 per day | 10 00 | ..... | 10 00 |
| E. B. Hollenbeck..... | Laborer..... | 62 | 2 00 per day | 124 00 | ..... | 124 00 |
| John S. Heath..... | Laborer..... | 58 | 2 00 per day | 116 00 | ..... | 116 00 |
| <i>Incidental Expenses.</i> | | | | | | \$5,277 63 |
| Livery..... | | | | \$157 62 | | |
| Telephone and telegraph..... | | | | 2 05 | | |
| Postage..... | | | | 1 25 | | |
| Miscellaneous..... | | | | 20 25 | | |
| | | | | | | 181 17 |
| Total..... | | | | | | \$5,458 80 |
| NOTE.— Apportioned to the different Divisions and Canals as follows: | | | | | | |
| Eastern Division, Erie Canal, 30%..... | | | | \$1,637 64 | | |
| Eastern Division, Champlain Canal, 5%..... | | | | 272 84 | | |
| Middle Division, Erie Canal, 30%..... | | | | 1,637 64 | | |
| Middle Division, Oswego Canal, 5%..... | | | | 272 84 | | |
| Western Division, Erie Canal, 30%..... | | | | 1,637 64 | | |
| Total..... | | | | | | \$5,458 80 |

REPORT OF STATE ENGINEER.

Dam, Beaver River.

(Chapter 606, Laws 1898; chapter 428, Laws 1900; chapter 679, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|------------------------|-----------------|-----------------------|----------|----------|------------|
| Wm. B. Landreth.... | Resident engineer.... | | \$2,400 per yr. | \$131 40 | \$148 78 | \$280 18 |
| M. H. Ranney..... | Assistant engineer.... | 269 | 5 00 per day | 1,345 00 | 869 29 | 2,214 29 |
| Frederick Edwards.... | Draftsman..... | 6 | 4 50 per day | 27 00 | | 27 00 |
| James C. Dunbar..... | Laborer..... | 180 | 2 00 per day | 360 00 | | 360 00 |
| Edward Hollenbeck.... | Laborer..... | 168 | 2 00 per day | 336 00 | | 336 00 |
| <i>Incidental Expenses.</i> | | | | | | \$3,217 47 |
| Stationery and printing..... | | | | \$18 80 | | |
| Livery..... | | | | 6 00 | | |
| Postage..... | | | | 10 18 | | |
| Telegraph and telephone..... | | | | 77 50 | | |
| Miscellaneous..... | | | | 43 90 | | |
| | | | | | | 156 47 |
| Total..... | | | | | | \$3,373 94 |

Improvement Shinnecock Canal.

(Chapter 419, Laws 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|------------------------|-----------------|-----------------------|----------|---------|----------|
| Wm. B. Landreth.... | Resident engineer.... | | | | \$0 25 | \$0 25 |
| John R. Kaley..... | Assistant engineer.... | 104 | \$5 00 per day | \$520 00 | 24 97 | 544 97 |
| Wm. D. Strong..... | Chapman..... | 10 | 3 00 per day | 30 00 | | 30 00 |
| C. H. Fosdick..... | Laborer..... | 29 | 2 00 per day | 58 00 | | 58 00 |
| R. W. Barrett..... | Laborer..... | 27 | 2 00 per day | 54 00 | 6 73 | 60 73 |
| <i>Incidental Expenses.</i> | | | | | | \$702 95 |
| Livery..... | | | | \$2 00 | | |
| Postage..... | | | | 83 | | |
| Telegraph and telephone..... | | | | 1 65 | | |
| Miscellaneous..... | | | | 12 75 | | |
| | | | | | | 17 23 |
| Total..... | | | | | | \$720 18 |

EASTERN DIVISION: COUNTY LINE SURVEY.

273

Repairing and Extension of Sea Wall at Orient, Suffolk County.
(Chapter 692, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|-------------------------------|-----------------|-----------------------|---------|---------|----------|
| William B. Landreth. | Resident engineer.... | ..... | \$2,400 per yr. | \$46 86 | \$44 58 | \$91 24 |
| C. T. Middlebrook.... | First assistant engineer..... | 43 | 6 00 per day | 258 06 | 53 94 | 311 94 |
| <i>Incidental Expenses.</i> | | | | | | \$403 18 |
| Stationery and printing..... | | | | | \$6 43 | |
| Livery..... | | | | | 19 25 | |
| Telephone and telegraph..... | | | | | 95 | |
| Miscellaneous..... | | | | | 4 39 | |
| Total..... | | | | | | 31 02 |
| | | | | | | \$434 20 |

Survey St. Lawrence County Line.
(Chapter 473, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|---------------------|-----------------|-----------------------|----------|----------|------------|
| C. H. Flanigan..... | Engineer in charge. | 28 | \$6 00 per day | \$168 00 | \$253 85 | \$421 85 |
| C. H. Flanigan..... | Engineer in charge. | 92 | 7 50 per day | 690 00 | 576 04 | 1,266 04 |
| D. C. Wood..... | Expert surveyor.... | 102 | 5 00 per day | 510 00 | ..... | 510 00 |
| Daniel Lynch..... | Expert surveyor.... | 52 | 5 00 per day | 260 00 | ..... | 260 00 |
| F. B. Williams..... | Leveler..... | 70 | 4 50 per day | 315 00 | ..... | 315 00 |
| H. J. Richardson..... | Rodman..... | 16 | 3 50 per day | 56 00 | 27 56 | 83 56 |
| W. J. Devaney..... | Rodman..... | 19 | 3 50 per day | 66 50 | ..... | 66 50 |
| Michael McGraw..... | Guide..... | 81 | 2 50 per day | 202 50 | ..... | 202 50 |
| Ezra G. Hollerbeck.... | Guide..... | 92 | 2 50 per day | 230 00 | ..... | 230 00 |
| Leonard Anderson.... | Laborer..... | 8 | 2 00 per day | 16 00 | ..... | 16 00 |
| Wilbur Freeman..... | Laborer..... | 5 | 2 00 per day | 10 00 | ..... | 10 00 |
| Frank Johnson..... | Laborer..... | 5 | 2 00 per day | 10 00 | ..... | 10 00 |
| Edward Labrie..... | Laborer..... | 8 | 2 00 per day | 16 00 | ..... | 16 00 |
| Peter Passame..... | Laborer..... | 8 | 2 00 per day | 16 00 | ..... | 16 00 |
| John Biglo..... | Laborer..... | 8 | 2 00 per day | 16 00 | ..... | 16 00 |
| Ezra Bushie..... | Laborer..... | 8 | 2 00 per day | 16 00 | ..... | 16 00 |
| E. G. Hollenbeck..... | Laborer..... | 18 | 2 00 per day | 36 00 | ..... | 36 00 |
| Herman Dodge..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| H. K. Kenyon..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| James Cole..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| Thomas Donohue..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| Henry H. Chapman..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| Charles A. Shepard..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| F. B. Murray..... | Laborer..... | 65 | 2 00 per day | 130 00 | ..... | 130 00 |
| Hugh Call..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| James C. Miller..... | Laborer..... | 32 | 2 00 per day | 62 00 | ..... | 62 00 |
| John Turnbull..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| William R. Cole..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| Jesse Barnet..... | Laborer..... | 87 | 2 00 per day | 174 00 | ..... | 174 00 |
| Harold B. Gates..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| William R. Gordon..... | Laborer..... | 92 | 2 00 per day | 184 00 | ..... | 184 00 |
| Andrew Trautz..... | Laborer..... | 62 | 2 00 per day | 124 00 | ..... | 124 00 |
| Alfred Ordenwalder.... | Laborer..... | 88 | 2 00 per day | 176 00 | ..... | 176 00 |
| Vischer Burton..... | Laborer..... | 87 | 2 00 per day | 174 00 | ..... | 174 00 |
| Lee Howell..... | Laborer..... | 86 | 2 00 per day | 172 00 | ..... | 172 00 |
| Porter Lee Merriman..... | Laborer..... | 85 | 2 00 per day | 170 00 | ..... | 170 00 |
| A. M. Robertson..... | Laborer..... | 57 | 2 00 per day | 114 00 | ..... | 114 00 |
| L. H. Clark..... | Laborer..... | 40 | 2 00 per day | 80 00 | ..... | 80 00 |
| Edward Scandian..... | Laborer..... | 9 | 2 00 per day | 18 00 | ..... | 18 00 |
| Roma Lans..... | Laborer..... | 30 | 2 00 per day | 60 00 | ..... | 60 00 |
| <i>Incidental Expenses</i> | | | | | | \$6,969 45 |
| Livery..... | | | | | \$89 25 | |
| Postage..... | | | | | 2 00 | |
| Telegraph and telephone..... | | | | | 13 10 | |
| Miscellaneous..... | | | | | 1,841 31 | |
| Total..... | | | | | | \$8,915 11 |

Surveys for Forest Preserve Board.

(Chapter 645, Laws 1901; chapter 594, Laws of 1902.)

| NAME. | Rank. | Number of Days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|---------------------|-----------------|-----------------------|----------|----------|------------|
| Will H. Corey..... | Expert surveyor.... | 69 | \$5 00 per day | \$345 00 | \$384 99 | \$729 99 |
| James R. McClintock | Chainman..... | 70 | 2 50 per day | 175 00 | 5 84 | 180 84 |
| Wilson G. Harger..... | Chainman..... | 69 | 2 50 per day | 172 50 | | 172 50 |
| James R. McClintock. | Laborer..... | 25 | 2 00 per day | 50 00 | | 50 00 |
| William Rolfe..... | Laborer..... | 73 | 2 00 per day | 146 00 | | 146 00 |
| H. S. Remington..... | Laborer..... | 65 | 2 00 per day | 130 00 | | 130 00 |
| W. F. Sanderson..... | Laborer..... | 61 | 2 00 per day | 122 00 | | 122 00 |
| G. E. Mulligan..... | Laborer..... | 80 | 2 00 per day | 120 00 | | 120 00 |
| A. R. Harper..... | Laborer..... | 61 | 2 00 per day | 122 00 | | 122 00 |
| | | | | | | \$1,773 33 |
| <i>Incidental Expenses.</i> | | | | | | |
| Livery..... | | | | \$42 50 | | |
| Telegraph and telephone..... | | | | 1 75 | | |
| Miscellaneous..... | | | | 233 16 | | |
| | | | | | | 277 41 |
| Total..... | | | | | | \$2,050 74 |

State Court of Claims.

(Chapter 419, Laws 1900; chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|------------|
| Wm. B. Landreth..... | Resident engineer.. | ... | \$2,400 per yr. | \$38 71 | \$69 00 | \$107 71 |
| John R. Kaley..... | Assistant engineer.. | 11 | 5 00 per day | 55 00 | 1 60 | 56 60 |
| Clark Brown..... | Assistant engineer.. | 6 | 5 00 per day | 30 00 | | 30 00 |
| George L. Schillner..... | Draftsman..... | 59 | 4 50 per day | 265 50 | | 265 50 |
| John A. O'Connor..... | Draftsman..... | 104 | 5 00 per day | 520 00 | 92 32 | 612 32 |
| John A. O'Connor..... | Draftsman..... | 44 | 4 50 per day | 198 00 | | 198 00 |
| George D. Williams..... | Leveler..... | 17 | 4 50 per day | 76 50 | 2 64 | 79 14 |
| F. N. Sanders..... | Leveler..... | 6 | 4 50 per day | 27 00 | | 27 00 |
| T. A. Hendrickson..... | Leveler..... | 6 | 4 50 per day | 27 00 | 13 18 | 40 18 |
| Ralph Russell..... | Leveler..... | 22 | 4 50 per day | 99 00 | 53 33 | 152 33 |
| Perry Filkin..... | Leveler..... | 4 | 4 50 per day | 18 00 | | 18 00 |
| H. W. DeGraff..... | Leveler..... | 10 | 4 50 per day | 45 00 | | 45 00 |
| H. J. Richardson..... | Rodman..... | 126 | 3 50 per day | 441 00 | 9 43 | 450 43 |
| W. J. Gilmour..... | Rodman..... | 5 | 3 50 per day | 17 50 | 10 07 | 27 57 |
| Dwight B. La Du..... | Chainman..... | 14 | 3 00 per day | 42 00 | | 42 00 |
| Eustace Hulsapple..... | Chainman..... | 5 | 2 50 per day | 12 50 | | 12 50 |
| James T. Brady..... | Chainman..... | 5 | 2 50 per day | 12 50 | 4 93 | 17 43 |
| Augustus Rogers..... | Laborer..... | 5 | 2 00 per day | 10 00 | | 10 00 |
| Harry Poole..... | Laborer..... | 7 | 2 00 per day | 14 00 | | 14 00 |
| Henry D. Tefft..... | Laborer..... | 5 | 2 00 per day | 10 00 | | 10 00 |
| Lawrence R. Ellis..... | Laborer..... | 4 | 2 00 per day | 8 00 | | 8 00 |
| Harry G. Stuts..... | Laborer..... | 2 | 2 00 per day | 4 00 | | 4 00 |
| Henry S. Wells..... | Laborer..... | 9 | 2 00 per day | 18 00 | | 18 00 |
| | | | | | | \$2,245 71 |
| <i>Incidental Expenses.</i> | | | | | | |
| Livery..... | | | | \$15 00 | | |
| Telegraph and telephone..... | | | | 1 55 | | |
| Miscellaneous..... | | | | 311 20 | | |
| | | | | | | 327 75 |
| Total..... | | | | | | \$2,573 46 |

Examination Monuments, Surveys, Maps, Etc.

(Chapter 419, Laws 1900; chapter 645, Laws 1901; chapter 594, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------------------|-----------------|-----------------------|----------|---------|------------|
| C. H. Flanigan..... | Engineer in charge. | 48 | \$6 00 per day | \$288 00 | \$52 65 | \$340 65 |
| Edward A. Bond..... | State engineer and surveyor..... | | | | 163 17 | 163 17 |
| M. Peckham, Jr..... | Land clerk..... | | | | 63 31 | 63 31 |
| Irving J. Morris..... | Chief clerk..... | | | | 37 03 | 37 03 |
| Foster B. Morris..... | Assistant engineer. | 11 | 5 00 per day | 55 00 | | 55 00 |
| H. P. Willis..... | Leveler..... | 273 | 4 50 per day | 1,228 50 | 621 25 | 1,849 75 |
| Charles D. Burrus..... | Draftsman..... | 50 | 5 00 per day | 250 00 | | 250 00 |
| George L. Schillner..... | Draftsman..... | 177 | 4 50 per day | 796 50 | | 796 50 |
| Parkes D. Wendell..... | Chainman..... | 106 | 3 00 per day | 318 00 | | 318 00 |
| F. L. Fonda..... | Chainman..... | 121 | 3 00 per day | 363 00 | | 363 00 |
| D. B. La Du..... | Chainman..... | 14 | 3 00 per day | 42 00 | 40 50 | 82 50 |
| James R. McClintock..... | Chainman..... | 5 | 2 50 per day | 12 50 | | 12 50 |
| Frank H. Northrop..... | Laborer..... | 106 | 2 00 per day | 212 00 | | 212 00 |
| Carl E. McCombs..... | Laborer..... | 82 | 2 00 per day | 164 00 | 309 42 | 473 42 |
| Charles G. Stuts..... | Laborer..... | 101 | 2 00 per day | 202 00 | | 202 00 |
| J. L. Derrick..... | Laborer..... | 100 | 2 00 per day | 200 00 | | 200 00 |
| B. G. Priest..... | Laborer..... | 97 | 2 00 per day | 194 00 | | 194 00 |
| Heber Stark..... | Laborer..... | 99 | 2 00 per day | 198 00 | | 198 00 |
| George Robinson..... | Laborer..... | 100 | 2 00 per day | 200 00 | | 200 00 |
| Robert Gray..... | Laborer..... | 100 | 2 00 per day | 200 00 | | 200 00 |
| Thomas Armstrong..... | Laborer..... | 72 | 2 00 per day | 144 00 | | 144 00 |
| D. B. La Du..... | Laborer..... | 28 | 2 00 per day | 56 00 | | 56 00 |
| S. H. Stevens..... | Laborer..... | 14 | 2 00 per day | 28 00 | | 28 00 |
| A. H. Scott..... | Laborer..... | 10 | 2 00 per day | 20 00 | | 20 00 |
| <i>Incidental Expenses.</i> | | | | | | \$6,458 83 |
| Stationery and printing..... | | | | \$39 40 | | |
| Livery..... | | | | 1,042 74 | | |
| Postage..... | | | | 2 68 | | |
| Telegraph and telephone..... | | | | 23 35 | | |
| Miscellaneous..... | | | | 2,132 79 | | |
| | | | | | | 3,241 05 |
| Total..... | | | | | | \$9,699 88 |

Old Field Notes, Maps, Etc.

(Chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|----------------------|---------------|-----------------|-----------------------|----------|---------|----------|
| Parkes D. Wendell... | Chainman..... | 159 | \$3 00 per day | \$477 00 | | \$477 00 |

Improvement Public Highways.

(Chapter 115, Laws 1898.)

| NAME | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------|-----------------------------|-----------------|-----------------------|----------|----------|----------|
| H. A. Van Alstyne... | Division engineer... | .... | \$3,000 per yr. | ..... | \$570 08 | \$570 08 |
| Wm. B. Landreth... | Resident engineer... | .... | 2,400 per yr. | \$583 18 | 375 24 | 958 42 |
| W. J. Valleau... | Financial clerk... | .... | 2,100 per yr. | 79 03 | 68 30 | 147 33 |
| C. H. Flanigan... | Engineer in charge... | 176 | 6 00 per day | 1,056 00 | 1,043 51 | 2,099 51 |
| Reeves Smith... | First assistant engineer... | 1 | 6 00 per day | 6 00 | ..... | 6 00 |
| H. W. DeGraff... | Assistant engineer... | 80 | 5 00 per day | 400 00 | 95 46 | 495 46 |
| Clark Brown... | Assistant engineer... | 99 | 5 00 per day | 495 00 | 31 01 | 526 01 |
| M. B. Palmer... | Assistant engineer... | 56 | 5 00 per day | 280 00 | 16 08 | 296 08 |
| C. A. Sullivan... | Assistant engineer... | 68 | 5 00 per day | 340 00 | 32 18 | 372 18 |
| Noble E. Whitford... | Assistant engineer... | 323 | 5 00 per day | 1,615 00 | 1,573 64 | 3,188 64 |
| Foster B. Moss... | Assistant engineer... | 257 | 5 00 per day | 1,285 00 | 189 30 | 1,474 30 |
| A. M. Evans... | Assistant engineer... | 5 | 5 00 per day | 25 00 | ..... | 25 00 |
| R. J. Marcher... | Assistant engineer... | 272 | 5 00 per day | 1,360 00 | 67 64 | 1,427 64 |
| F. N. Sanders... | Assistant engineer... | 191 | 5 00 per day | 955 00 | 242 63 | 1,197 63 |
| M. H. Ranney... | Assistant engineer... | 65 | 5 00 per day | 325 00 | 84 49 | 409 49 |
| F. S. Strong... | Assistant engineer... | 81 | 5 00 per day | 405 00 | 14 45 | 419 45 |
| W. J. Gilmour... | Assistant engineer... | 10 | 5 00 per day | 50 00 | 1 83 | 51 83 |
| F. M. Williams... | Leveller... | 312 | 4 50 per day | 1,404 00 | 627 65 | 2,031 65 |
| H. W. DeGraff... | Leveller... | 224 | 4 50 per day | 1,008 00 | 871 92 | 1,879 92 |
| Perry Filkin... | Leveller... | 283 | 4 50 per day | 1,273 50 | 14 60 | 1,288 10 |
| L. G. Fenton... | Leveller... | 122 | 4 50 per day | 549 00 | 14 70 | 563 70 |
| George D. Williams... | Leveller... | 278 | 4 50 per day | 1,251 00 | 950 59 | 2,201 59 |
| James K. Browne... | Leveller... | 35 | 4 50 per day | 157 50 | 40 83 | 198 33 |
| F. N. Sanders... | Leveller... | 69 | 4 50 per day | 310 50 | 104 17 | 414 67 |
| G. A. Ensign... | Leveller... | 70 | 4 50 per day | 315 00 | 19 12 | 334 12 |
| O. J. Dempster... | Leveller... | 278 | 4 50 per day | 1,251 00 | 23 17 | 1,274 17 |
| T. A. Hendrickson... | Leveller... | 186 | 4 50 per day | 837 00 | 61 88 | 898 88 |
| H. P. Willis... | Leveller... | 34 | 4 50 per day | 153 00 | 161 44 | 314 44 |
| Ralph Russell... | Leveller... | 224 | 4 50 per day | 1,008 00 | 247 26 | 1,255 26 |
| Fred S. Strong... | Leveller... | 201 | 4 50 per day | 904 50 | 41 75 | 946 25 |
| C. H. MacCulloch... | Leveller... | 106 | 4 50 per day | 477 00 | 67 52 | 544 52 |
| George H. Penfield... | Leveller... | 151 | 4 50 per day | 679 50 | 18 95 | 698 45 |
| Frank D. Lyon... | Special inspector... | 87 | 5 00 per day | 435 00 | 218 42 | 653 42 |
| James T. Brady... | Inspector of highways... | 104 | 3 50 per day | 364 00 | 5 40 | 369 40 |
| H. C. Titus... | Inspector of highways... | 111 | 3 50 per day | 388 50 | 37 52 | 426 02 |
| L. L. Melius... | Inspector of highways... | 104 | 3 50 per day | 364 00 | 4 90 | 368 90 |
| Jesse C. Patrick... | Inspector of highways... | 26 | 4 50 per day | 117 00 | 15 58 | 132 58 |
| John A. O'Connor... | Draftsman... | 100 | 5 00 per day | 500 00 | ..... | 500 00 |
| John A. O'Connor... | Draftsman... | 25 | 4 50 per day | 112 50 | ..... | 112 50 |
| Fred Edwards... | Draftsman... | 1 | 4 50 per day | 4 50 | ..... | 4 50 |
| S. W. Belding... | Draftsman... | 104 | 4 50 per day | 468 00 | 16 58 | 484 58 |
| L. W. Cottrell... | Draftsman... | 23 | 3 50 per day | 80 50 | 3 50 | 84 00 |
| George Schillner... | Draftsman... | 23 | 4 50 per day | 103 50 | ..... | 103 50 |
| H. H. Bush... | Draftsman... | 79 | 3 50 per day | 276 50 | ..... | 276 50 |
| W. E. Conklin... | Rodman... | 138 | 3 50 per day | 483 00 | 78 68 | 561 68 |
| Frank Roberts... | Rodman... | 72 | 3 50 per day | 252 00 | 2 85 | 254 85 |
| H. J. Richardson... | Rodman... | 14 | 3 50 per day | 49 00 | 23 07 | 72 07 |
| B. J. Cornell... | Rodman... | 123 | 3 50 per day | 430 50 | 14 76 | 445 26 |
| W. J. Gilmour... | Rodman... | 253 | 3 50 per day | 885 50 | 115 24 | 1,000 74 |
| J. C. Patrick... | Rodman... | 130 | 3 50 per day | 455 00 | 17 38 | 472 38 |
| W. M. Bristow... | Rodman... | 54 | 3 50 per day | 189 00 | 8 08 | 197 08 |
| Lewis G. Fisher... | Rodman... | 76 | 3 50 per day | 266 00 | 5 14 | 271 14 |
| C. H. MacCulloch... | Rodman... | 183 | 3 50 per day | 640 50 | ..... | 640 50 |
| H. F. Hawley... | Rodman... | 19 | 3 50 per day | 66 50 | 1 66 | 68 16 |
| Alfred King... | Rodman... | 31 | 3 50 per day | 108 50 | ..... | 108 50 |
| Judson T. Wells... | Rodman... | 54 | 3 50 per day | 189 00 | ..... | 189 00 |
| H. Elting Breed... | Rodman... | 124 | 3 50 per day | 434 00 | ..... | 434 00 |
| L. S. Huburd... | Rodman... | 71 | 3 50 per day | 248 50 | ..... | 248 50 |
| Frank Lutz... | Chainman... | 44 | 2 50 per day | 110 00 | 64 40 | 174 40 |
| H. S. Miller... | Chainman... | 162 | 3 00 per day | 486 00 | ..... | 486 00 |
| Fred H. Owens... | Chainman... | 81 | 2 50 per day | 202 50 | ..... | 202 50 |
| Fred H. Owens... | Chainman... | 58 | 3 00 per day | 174 00 | 2 28 | 176 28 |
| L. L. Melius... | Chainman... | 146 | 3 00 per day | 438 00 | 64 14 | 502 14 |
| W. G. Craig... | Chainman... | 94 | 2 50 per day | 235 00 | 7 86 | 242 86 |
| Lloyd W. Greene... | Chainman... | 63 | 2 50 per day | 157 50 | 3 46 | 160 96 |
| Frank Bisbee... | Chainman... | 14 | 2 50 per day | 35 00 | ..... | 35 00 |

Improvement Public Highway—(Continued).

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|--------------------------|---------------|-----------------|-----------------------|---------|---------|---------|
| A. H. Avakian..... | Chainman..... | 11 | \$2 50 per day | \$27 50 | | \$27 50 |
| W. M. Kline..... | Chainman..... | 14 | 2 50 per day | 35 00 | | 35 00 |
| Charles A. Carruth..... | Chainman..... | 25 | 2 50 per day | 62 50 | | 62 50 |
| Richard E. Phillips..... | Chainman..... | 13 | 2 50 per day | 32 50 | | 32 50 |
| James R. McClintock..... | Chainman..... | 14 | 2 50 per day | 35 00 | | 35 00 |
| James T. Brady..... | Chainman..... | 204 | 2 50 per day | 510 00 | \$7 10 | 517 10 |
| F. G. Tilton..... | Chainman..... | 47 | 2 50 per day | 117 50 | | 117 50 |
| Frank Kromer..... | Chainman..... | 50 | 2 50 per day | 125 00 | 30 21 | 155 21 |
| H. C. Titus..... | Chainman..... | 189 | 3 00 per day | 567 00 | 1 66 | 568 66 |
| A. Van Rensselaer..... | Chainman..... | 19 | 3 00 per day | 57 00 | | 57 00 |
| A. Van Rensselaer..... | Chainman..... | 67 | 2 50 per day | 167 50 | | 167 50 |
| C. W. G. Costello..... | Chainman..... | 4 | 2 50 per day | 10 00 | 1 94 | 11 94 |
| Arthur C. Perkins..... | Chainman..... | 27 | 3 00 per day | 81 00 | | 81 00 |
| Arthur C. Perkins..... | Chainman..... | 70 | 2 50 per day | 175 00 | 3 14 | 178 14 |
| William E. Petty..... | Chainman..... | 21 | 2 50 per day | 52 50 | | 52 50 |
| William B. Strong..... | Chainman..... | 30 | 3 00 per day | 90 00 | | 90 00 |
| Lloyd Olmstead..... | Chainman..... | 20 | 2 50 per day | 50 00 | | 50 00 |
| E. G. Fish..... | Chainman..... | 64 | 2 50 per day | 160 00 | | 160 00 |
| E. A. Bonney..... | Chainman..... | 3 | 3 00 per day | 9 00 | 2 40 | 11 40 |
| William Van Epps..... | Chainman..... | 60 | 3 00 per day | 180 00 | 13 89 | 193 89 |
| K. B. Turner..... | Chainman..... | 56 | 2 50 per day | 140 00 | 1 68 | 141 68 |
| George McDonald..... | Chainman..... | 205 | 3 00 per day | 615 00 | | 615 00 |
| F. L. Fonda..... | Chainman..... | 28 | 3 00 per day | 84 00 | | 84 00 |
| A. W. Giles..... | Chainman..... | 5 | 2 50 per day | 12 50 | | 12 50 |
| B. B. Weber, Jr..... | Chainman..... | 79 | 2 50 per day | 197 50 | | 197 50 |
| Raymond Haverley..... | Chainman..... | 21 | 2 50 per day | 52 50 | | 52 50 |
| F. J. Mulvaney..... | Chainman..... | 76 | 2 50 per day | 190 00 | | 190 00 |
| Homer C. Greene..... | Chainman..... | 25 | 2 50 per day | 62 50 | | 62 50 |
| J. R. Mahan..... | Chainman..... | 71 | 2 50 per day | 177 50 | | 177 50 |
| Eustace Hulsapple..... | Chainman..... | 20 | 2 50 per day | 50 00 | | 50 00 |
| D. B. La Du..... | Chainman..... | 54 | 3 00 per day | 162 00 | 11 66 | 173 66 |
| E. S. Van Dyck..... | Chainman..... | 21 | 2 50 per day | 52 50 | | 52 50 |
| R. J. Revan..... | Chainman..... | 29 | 2 50 per day | 72 50 | 5 64 | 78 14 |
| C. H. Fosdick..... | Chainman..... | 28 | 2 50 per day | 70 00 | | 70 00 |
| Parkes D. Wendell..... | Chainman..... | 61 | 3 00 per day | 183 00 | 35 97 | 218 97 |
| F. W. Hartwell..... | Chainman..... | 23 | 2 50 per day | 57 50 | 2 78 | 60 28 |
| Henry D. Tefft..... | Chainman..... | 13 | 2 50 per day | 32 50 | 1 73 | 34 23 |
| H. C. Yerkes..... | Chainman..... | 20 | 2 50 per day | 50 00 | | 50 00 |
| J. H. Sturdevant..... | Chainman..... | 64 | 2 50 per day | 160 00 | | 160 00 |
| Fred J. McDonald..... | Chainman..... | 29 | 2 50 per day | 72 50 | 81 | 73 31 |
| Harry Bowen..... | Laborer..... | 305 | 2 00 per day | 610 00 | 68 08 | 678 08 |
| John W. Sage..... | Laborer..... | 44 | 2 00 per day | 88 00 | 67 30 | 155 30 |
| C. H. Fosdick..... | Laborer..... | 265 | 2 00 per day | 530 00 | 25 21 | 555 21 |
| B. G. Priest..... | Laborer..... | 36 | 2 00 per day | 72 00 | | 72 00 |
| B. F. Clark..... | Laborer..... | 11 | 2 00 per day | 22 00 | | 22 00 |
| F. A. Bedell..... | Laborer..... | 181 | 2 00 per day | 362 00 | 2 76 | 364 76 |
| E. H. Butler..... | Laborer..... | 54 | 2 00 per day | 108 00 | 4 20 | 112 20 |
| C. J. Cassevah..... | Laborer..... | 11 | 2 00 per day | 22 00 | | 22 00 |
| A. S. Kinney..... | Laborer..... | 6 | 2 00 per day | 12 00 | | 12 00 |
| Harry Cook..... | Laborer..... | 65 | 2 00 per day | 130 00 | 1 18 | 131 18 |
| George Conover..... | Laborer..... | 151 | 2 00 per day | 302 00 | 40 00 | 342 00 |
| J. R. Mahan..... | Laborer..... | 74 | 2 00 per day | 148 00 | | 148 00 |
| Lawrence R. Ellis..... | Laborer..... | 113 | 2 00 per day | 226 00 | | 226 00 |
| Harry G. Stuts..... | Laborer..... | 87 | 2 00 per day | 174 00 | | 174 00 |
| James H. McElroy..... | Laborer..... | 90 | 2 00 per day | 180 00 | | 180 00 |
| F. McEwan Pruyn..... | Laborer..... | 170 | 2 00 per day | 340 00 | 15 46 | 355 46 |
| Seward A. Clark..... | Laborer..... | 44 | 2 00 per day | 88 00 | 3 94 | 91 94 |
| Henry Ivison..... | Laborer..... | 50 | 2 00 per day | 100 00 | 2 94 | 102 94 |
| John S. Heath..... | Laborer..... | 171 | 2 00 per day | 342 00 | | 342 00 |
| John Y. Shepard..... | Laborer..... | 128 | 2 00 per day | 256 00 | | 256 00 |
| Lewis L. Crozier..... | Laborer..... | 104 | 2 00 per day | 208 00 | | 208 00 |
| E. G. Hollenbeck..... | Laborer..... | 58 | 2 00 per day | 116 00 | | 116 00 |
| Eugene Johnson..... | Laborer..... | 10 | 2 00 per day | 20 00 | | 20 00 |
| Henry D. Tefft..... | Laborer..... | 86 | 2 00 per day | 172 00 | 2 44 | 174 44 |
| John H. Tripp..... | Laborer..... | 57 | 2 00 per day | 114 00 | | 114 00 |
| Fred J. McDonald..... | Laborer..... | 118 | 2 00 per day | 236 00 | 12 64 | 248 64 |
| Charles G. Ranney..... | Laborer..... | 76 | 2 00 per day | 152 00 | | 152 00 |
| Henry G. Throop..... | Laborer..... | 59 | 2 00 per day | 118 00 | | 118 00 |
| S. A. Clark..... | Laborer..... | 67 | 2 00 per day | 134 00 | | 134 00 |
| William Riley..... | Laborer..... | 229 | 2 00 per day | 458 00 | | 458 00 |
| Harry Poole..... | Laborer..... | 305 | 2 00 per day | 610 00 | 135 80 | 745 80 |
| C. R. Cornwell..... | Laborer..... | 233 | 2 00 per day | 466 00 | | 466 00 |
| W. M. Payne..... | Laborer..... | 294 | 2 00 per day | 588 00 | 8 56 | 596 56 |

Improvement Public Highways—(Concluded).

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|--------------|-----------------|-----------------------|------------|---------|-------------|
| H. Elting Breed..... | Laborer..... | 153 | \$2 00 per day | \$306 00 | | \$306 00 |
| E. C. Likely..... | Laborer..... | 281 | 2 00 per day | 562 00 | | 562 00 |
| D. B. La Du..... | Laborer..... | 36 | 2 00 per day | 72 00 | \$12 10 | 84 10 |
| Clark R. Hall..... | Laborer..... | 19 | 2 00 per day | 38 00 | 5 58 | 43 58 |
| Fred Christfield..... | Laborer..... | 163 | 2 00 per day | 326 00 | 13 44 | 339 44 |
| A. W. Rogers..... | Laborer..... | 89 | 2 00 per day | 178 00 | 2 62 | 180 62 |
| A. B. Bergavin..... | Laborer..... | 18 | 2 00 per day | 36 00 | | 36 00 |
| Harry C. Tyler..... | Laborer..... | 14 | 2 00 per day | 28 00 | 15 75 | 43 75 |
| Henry S. Wells..... | Laborer..... | 76 | 2 00 per day | 152 00 | 8 23 | 160 23 |
| Walter K. Ward..... | Laborer..... | 75 | 2 00 per day | 150 00 | 5 64 | 155 64 |
| John J. Vrooman..... | Laborer..... | 64 | 2 00 per day | 128 00 | | 128 00 |
| Roscoe Derrick..... | Laborer..... | 71 | 2 00 per day | 142 00 | | 142 00 |
| Henry Simons..... | Laborer..... | 56 | 2 00 per day | 112 00 | | 112 00 |
| S. T. Fisher..... | Laborer..... | 69 | 2 00 per day | 138 00 | | 138 00 |
| James C. Bell..... | Laborer..... | 66 | 2 00 per day | 132 00 | | 132 00 |
| A. Van Tassel..... | Laborer..... | 94 | 2 00 per day | 188 00 | 8 36 | 196 36 |
| Andrew Taylor..... | Laborer..... | 27 | 2 00 per day | 54 00 | | 54 00 |
| C. W. Dutcher..... | Laborer..... | 53 | 2 00 per day | 106 00 | | 106 00 |
| Robert Wamsley..... | Laborer..... | 117 | 2 00 per day | 234 00 | 4 69 | 238 69 |
| P. Hamilton..... | Laborer..... | 53 | 2 00 per day | 106 00 | | 106 00 |
| N. Acker..... | Laborer..... | 157 | 2 00 per day | 314 00 | | 314 00 |
| J. L. Sweet..... | Laborer..... | 38 | 2 00 per day | 76 00 | 7 09 | 83 09 |
| C. R. Nasmith..... | Laborer..... | 8 | 2 00 per day | 16 00 | | 16 00 |
| L. L. Luther..... | Laborer..... | 58 | 2 00 per day | 116 00 | 4 18 | 120 18 |
| Thomas Somerville..... | Laborer..... | 5 | 2 00 per day | 10 00 | | 10 00 |
| M. S. Cole..... | Laborer..... | 27 | 2 00 per day | 54 00 | | 54 00 |
| E. P. Hillson..... | Laborer..... | 5 | 2 00 per day | 10 00 | | 10 00 |
| William Howatt..... | Laborer..... | 53 | 2 00 per day | 106 00 | | 106 00 |
| Owney West..... | Laborer..... | 12 | 2 00 per day | 24 00 | | 24 00 |
| Charles Myers..... | Laborer..... | 131 | 2 00 per day | 262 00 | | 262 00 |
| J. F. Kerwin..... | Laborer..... | 89 | 2 00 per day | 178 00 | 3 97 | 181 97 |
| J. A. Clark..... | Laborer..... | 153 | 2 00 per day | 306 00 | | 306 00 |
| Herbert C. Wells..... | Laborer..... | 83 | 2 00 per day | 166 00 | | 166 00 |
| Samuel Hammond..... | Laborer..... | 104 | 2 00 per day | 208 00 | | 208 00 |
| David Cox..... | Laborer..... | 105 | 2 00 per day | 210 00 | | 210 00 |
| E. S. Van Dyck..... | Laborer..... | 66 | 2 00 per day | 132 00 | 3 60 | 135 60 |
| George L. Blauvelt..... | Laborer..... | 85 | 2 00 per day | 170 00 | | 170 00 |
| Maurice Williams..... | Laborer..... | 10 | 2 00 per day | 20 00 | | 20 00 |
| Perry Tillinghast..... | Laborer..... | 52 | 2 00 per day | 104 00 | | 104 00 |
| Philip Parthesius..... | Laborer..... | 36 | 2 00 per day | 72 00 | 3 62 | 75 62 |
| R. Peckham..... | Laborer..... | 21 | 2 00 per day | 42 00 | | 42 00 |
| <i>Incidental Expenses.</i> | | | | | | \$57,904 99 |
| Livery..... | | | | \$5,256 20 | | |
| Postage..... | | | | 52 72 | | |
| Telegraph and telephone..... | | | | 252 87 | | |
| Stationery and printing..... | | | | 32 06 | | |
| Miscellaneous..... | | | | 1,189 66 | | |
| Total..... | | | | | | 6,783 51 |
| Total..... | | | | | | \$64,688 50 |

Improvement Public Highways.

(Chapter 115, Laws 1898; chapter 53, Laws 1902.)

| NAME OF ROAD. | No. | Town. | County. | Total. |
|-----------------------------------|-----|------------------|------------------|------------|
| Troy-Schenectady..... | 1 | Niskayuna..... | Schenectady..... | \$1,572 48 |
| Ardsley-Elmsford..... | 18 | Greenburgh..... | Westchester..... | 882 01 |
| Mamaroneck..... | 19 | Scarsdale..... | Westchester..... | 1,326 35 |
| White Plains-Armonk..... | 20 | Northcastle..... | Westchester..... | 806 25 |
| Loudon..... | 22 | Colonie..... | Albany..... | 861 65 |
| Ardsley-Elmsford (section 2)..... | 34 | Greenburgh..... | Westchester..... | 783 68 |
| Total..... | | | | \$6,232 42 |

Hydrography—Measurement of Flow of Streams.

(Chapter 594, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------|--------------------|-----------------|-----------------------|---------|---------|----------|
| Robert E. Horton..... | Hydrographer. U.S. | | | | | |
| | G. S..... | | | | | \$295 51 |
| H. R. Beebe..... | Assistant..... | | | | | 79 43 |
| William Nunn..... | Assistant..... | | | | | 27 60 |
| Total..... | | | | | | \$402 54 |

Topographic Survey.

(Chapter 645, Laws 1901; chapter 594, Laws 1902.)

| | |
|-------------------------------|----------|
| Allen, Dr. Cyrus and Son..... | \$50 00 |
| Allen, John J..... | 100 00 |
| Bumstead, Albert H..... | 1,331 97 |
| Beck, George H..... | 189 26 |
| Bennett, A. K..... | 26 43 |
| Bassett, C. C..... | 209 57 |
| Buckley, Jerry..... | 60 75 |
| Bosworth, F. L..... | 54 00 |
| Bassinger, T. G..... | 335 48 |
| Burnham Henry..... | 86 77 |
| Baldwin, David H..... | 380 95 |
| Burnham, M. S..... | 134 00 |
| Bond, Edward A..... | 51 95 |
| Bateman, C. H..... | 90 88 |
| Barrett, William..... | 108 99 |
| Churchill, S. C..... | 30 00 |
| Cole, L. J..... | 47 00 |
| Cole, George..... | 60 00 |
| Chidester & Baxter..... | 25 50 |
| Clarke, William C..... | 74 00 |
| Connell, Leo R..... | 33 58 |
| Dorrity, Hugh..... | 64 35 |
| Downs, George..... | 60 00 |
| Deuce, E. W..... | 13 50 |
| Daniels, Milo B..... | 49 68 |
| Dye, Delvert..... | 50 00 |
| Demens, Fred..... | 57 00 |
| Dimmick, G. M..... | 110 00 |
| Fisher, J. G..... | 40 00 |
| Fowler, A. T..... | 235 42 |
| Frost, A. B..... | 35 00 |
| Fitch, Francis T..... | 190 00 |
| Fisher, M. O..... | 180 25 |
| Fisher, J. G..... | 28 39 |
| Griffin & Hoxie..... | 55 85 |

Topographic Survey — (Concluded).

| | |
|--------------------------|--------------------|
| Goodfred, P. | \$9 03 |
| Querdrum, George H. | 1,970 60 |
| Greene, W. E. | 239 67 |
| Gayetty, J. I. | 178 33 |
| Graft, Fred, Jr. | 131 00 |
| Hunter, David | 168 60 |
| Hamilton, E. G. | 512 68 |
| Hoopers, Charles L. | 122 99 |
| Hackett, George. | 77 83 |
| Higgins, J. E. | 68 55 |
| Havens, A. S. | 60 00 |
| Hoffmeister, William | 18 25 |
| Hastings, Charles F. | 152 31 |
| Walter R. Harper. | 272 04 |
| Harvey, Fred J. | 32 58 |
| Hill, John J. | 40 00 |
| Ireland, E. I. | 120 00 |
| Jones, Oscar | 531 24 |
| Jennings, J. H. | 2,472 97 |
| Jones, Ray T. | 54 30 |
| Jump, Albert L. | 29 25 |
| King, John. | 33 44 |
| Kelly, William. | 214 50 |
| Latour, J. & Co. | 57 25 |
| Lovell, W. H. | 276 21 |
| Leverick, J. W. | 83 87 |
| Lyon, J. B. | 15 00 |
| Murphy, F. P. | 24 00 |
| Mills, G. C. | 120 00 |
| Morey, W. H. S. | 339 23 |
| Mearle, A. P., Jr. | 313 56 |
| Morey, F. J. | 64 67 |
| Mack, J. P. | 140 00 |
| Mallory, F. L. | 159 00 |
| Maguire, J. B. | 130 00 |
| McNair, E. L. | 646 54 |
| McCoy, J. T. | 17 14 |
| Ott, William. | 28 50 |
| Olin J. Day. | 70 00 |
| Peck, F. B. | 93 00 |
| Pine & Corbett. | 289 80 |
| Powers, Harry W. | 60 00 |
| Persons, Burt. | 60 00 |
| Raymond, George. | 60 00 |
| Roberts, A. C. | 1,529 76 |
| Razall, H. G. Manfg. Co. | 41 00 |
| Rizer, H. C. | 6 76 |
| Saidol, George. | 149 68 |
| Snell, W. L. | 40 00 |
| Stack, E. J. | 27 00 |
| Spring, H. G. | 50 00 |
| Shafer, Squire. | 87 50 |
| Soper, F. D. | 19 75 |
| Smith, George. | 60 00 |
| Spain, S. | 39 38 |
| Smith, Glen S. | 1,519 94 |
| Slaughter, T. Foster. | 142 81 |
| Sturdevant, Howard R. | 59 03 |
| Thompson, A. H. | 819 68 |
| Thomas, M. H. | 18 00 |
| Thompson, Ralph P. | 60 00 |
| Tucker, Leon E. | 92 17 |
| Tufts, Wm O. | 194 00 |
| Valleau, W. J. | 333 79 |
| Van Campen, F. R. | 60 97 |
| Whitman, J. M. Jr. | 518 92 |
| Wood, Frank. | 120 00 |
| Wilder S. K. & Son. | 43 50 |
| Williamson, Thomas, Jr. | 96 00 |
| Wideman, Arthur. | 96 50 |
| Williamson, D. R. | 60 00 |
| Wilson, H. M. | 125 00 |
| Young, Gilbert. | 491 27 |
| Total. | <u>\$22,039 94</u> |

The foregoing tables are summarised as follows:

Ordinary Repairs of Canals.

| | | |
|---|--|------------|
| 1 | Erie Canal, chapter 418, Laws of 1900 and chapter 644, Laws of 1901..... | \$8,708 21 |
| 2 | Champlain Canal, chapter 418, Laws of 1900 and chapter 644, Laws of 1901.. | 4,351 90 |

Extraordinary Repairs of Canals.

| | | |
|----|---|----------|
| 3 | Champlain Canal, removing obstructions Bond and Wood Creeks, chapter 683, Laws of 1901..... | 300 00 |
| 4 | Champlain Canal, bridge near Burton's saw mill, chapter 629, Laws of 1898; chapter 219, Laws of 1899 and chapter 443, Laws of 1900..... | 96 00 |
| 5 | Champlain Canal, bridge over Glens Falls feeder (Greene's bridge), chapter 423, Laws of 1901..... | 599 38 |
| 6 | Champlain Canal, bridge Fulton street, Waterford, chapter 697, Laws of 1901..... | 864 69 |
| 7 | Champlain Canal, bridge Ontario street, Cohoes, chapter 613, Laws of 1899 and chapter 682, Laws of 1901..... | 1,155 75 |
| 8 | Erie Canal, bridge at Rexford Flats, chapter 603, Laws of 1901..... | 870 00 |
| 9 | Erie Canal, bridge Otsquago creek, chapter 468, Laws of 1902..... | 28 39 |
| 10 | Erie Canal, improvement Dry River, 14th street, Watervliet, chapter 472, Laws of 1902..... | 95 91 |

Barge Canal Survey.

| | | |
|----|--|----------|
| 11 | Canal survey, head office payments, chapter 411, Laws of 1900..... | 5,458 80 |
|----|--|----------|

Special Work.

| | | |
|----|---|----------|
| 12 | Dam Beaver River, chapter 606, Laws of 1898; chapter 428, Laws of 1900 and chapter 679, Laws of 1901..... | 3,373 94 |
| 13 | Improvement Shinnecock Canal, chapter 419, Laws of 1900..... | 790 18 |
| 14 | Repairing and extending sea wall at Orient, chapter 629, Laws of 1902..... | 434 20 |

Special Surveys, Etc.

| | | |
|------------|---|---------------------|
| 15 | Survey St. Lawrence county line, chapter 473, Laws of 1902..... | 8,915 11 |
| 16 | Survey for Forest Preserve Board, chapter 645, Laws of 1901 and chapter 594, Laws of 1902..... | 2,050 74 |
| 17 | Surveys for State Court of Claims, chapter 419, Laws of 1900 and chapter 645, Laws of 1901..... | 2,573 46 |
| 18 | Examination of monuments, maps, etc., chapter 419, Laws of 1900; chapter 645, Laws of 1901 and chapter 594, Laws of 1902..... | 9,699 88 |
| 19 | Old field notes, maps, etc., chapter 645, Laws of 1901..... | 477 00 |
| 20 | Improvement public highways, chapter 115, Laws of 1898..... | 64,688 50 |
| 21 | Improvement public highways, chapter 115, Laws 1898; chapter 53, Laws of 1902..... | 6,232 42 |
| 22 | Hydrography, chapter 594, Laws of 1902..... | 402 54 |
| 23 | Topographic Survey, chapter 645, Laws of 1901; chapter 594, Laws of 1902.. | 22,039 94 |
| Total..... | | <u>\$144,134 94</u> |

TABLE OF CONTRACTS PENDING ON THE EASTERN DIVISION SEPTEMBER 30, 1902.

| NAME OF CONTRACTOR. | Date of contract. | Character of work. | Appropriation. | LEGISLATIVE ACT. | | Engineer's preliminary estimate. | Engineer's estimate at contract prices. | Payments to date. |
|----------------------------------|-------------------|---|----------------|------------------|-------|----------------------------------|---|-------------------|
| | | | | Chap. | Year. | | | |
| Joseph Baker..... | July 23, 1901 | For excavating a channel approach to the lower end of the lock in the dam across the Saranac river, recently built by Joseph H. Connors..... | \$2,000 00 | 688 | 1901 | \$600 00 | \$600 00 | \$408 00 |
| American Bridge Co.. | Oct. 23, 1901 | For constructing a bridge across the Champlain canal at Ontario street, Cohoes..... | 5,000 00 | 613 | 1899 | 13,466 00 | 10,405 50 | 7,038 00 |
| American Bridge Co.. | Oct. 23, 1901 | For constructing a bridge and approaches thereto over the Erie canal just west of the Upper Mohawk Aqueduct, near Rexford Plains, Saratoga and Schenectady counties.. | 8,000 00 | 682 | 1901 | | | |
| Strobel & Moynahan.. | Dec. 24, 1901 | For constructing a dam on Beaver river, near Stillwater, in the town of Webb, Herkimer county..... | 10,000 00 | 693 | 1901 | 8,700 00 | 8,128 00 | 5,796 00 |
| Joseph Hanigan..... | Aug. 1, 1902 | For building a sea wall between the Sound and Orient harbor on the part of Long Island lying between the villages of East Hampton and of Orient in the town of Southold, Suffolk county, Long Island.. | 7,000 00 | 696 | 1898 | 75,000 00 | 75,045 00 | 26,514 00 |
| Owego Bridge Co..... | July 21, 1902 | For constructing a bridge over the Otsego grade, in the town of Fort Plain, town of Minden, Montgomery county..... | 43,000 00 | 478 | 1900 | | | |
| Snell Brothers & J. Hanigan..... | Sept. 8, 1902 | For constructing retaining walls, sidewalks and curbing at the approaches to the bridge over the Erie canal at Fourteenth street, Watervliet, and for rebuilding the vertical slope walls, and excavating the channel of Dry river, in said city..... | 6,500 00 | 468 | 1902 | 5,453 50 | 6,822 50 | ..... |
| | | | 15,000 00 | 472 | 1902 | 13,240 00 | 12,234 75 | ..... |
| Fred G. Kerivan..... | May 8, 1900 | Improvement of Public Highways.
For improving 1.11 miles of the Frankfort and Utica road No. 14, town of Frankfort, Herkimer county..... | 150,000 00 | 115 | 1898 | 7,942 00 | 6,899 00 | 4,035 92 |
| Thomas H. Karr..... | July 16, 1901 | For improving 3.05 miles of the Troy and Brunswick (section 2) road No. 25, town of Brunswick, Rensselaer county..... | 150,000 00 | 115 | 1898 | 28,820 00 | 24,340 00 | 16,246 95 |

EASTERN DIVISION: CONTRACTS.

283

| | | | | | | | | |
|---|---------------|--|------------|-----|------|-----------|-----------|-----------|
| The town board of the town of Shandaken.. | June 10, 1901 | For improving 5.72 miles of the Ulster and Delaware Turnpike (section 3) road No. 31, town of Shandaken, Ulster county..... | 150,000 00 | 115 | 1898 | 41,723 00 | 34,494 00 | 27,865 92 |
| Alfred D. Norton, assignee of John R. Briggs..... | June 5, 1901 | For improving 4.04 miles of the Gloversville-Mayfield road No. 33, towns of Johnstown and Mayfield, Fulton county..... | 150,000 00 | 115 | 1898 | 33,720 00 | 27,456 09 | 12,664 64 |
| The town board of the town of Middletown. | June 18, 1901 | For improving 1.57 miles of the Griffins Corners road No. 36, town of Middletown, Delaware county..... | 150,000 00 | 115 | 1898 | 6,160 00 | 5,550 20 | 7,944 64 |
| Ballew & Merritt Co.. | May 6, 1902 | For improving 4.90 miles of the Saugerties-Woodstock (section 2) road No. 38, town of Saugerties, Ulster county..... | 800,000 00 | 115 | 1898 | 35,520 00 | 32,300 00 | 8,963 25 |
| Board of Supervisors of Orange County..... | June 18, 1901 | For improving 1.59 miles of the Turners-Monroe road No. 46, town of Monroe, Orange county..... | 150,000 00 | 115 | 1898 | 3,220 00 | 2,884 40 | ..... |
| Eldert & Johanknecht. | July 22, 1901 | For improving 4.41 miles of the Armonk-Mt. Kisco road No. 50, towns of North Castle and New Castle, Westchester county..... | 150,000 00 | 115 | 1898 | 37,562 00 | 34,200 00 | 20,194 50 |
| Ballew & Merritt Co.. | July 24, 1901 | For improving 5.04 miles of the Mt. Kisco-Bedford road No. 51, town of Bedford, Westchester county..... | 150,000 00 | 115 | 1898 | 44,084 00 | 40,314 77 | 39,512 50 |
| McCabe & Duffy..... | July 17, 1901 | For improving 2.65 miles of the Briar Cliff Manor and Echo Lake road No. 54, towns of Ossining and New Castle, Westchester county..... | 150,000 00 | 115 | 1898 | 22,540 00 | 20,100 00 | 14,773 50 |
| Prescott & Buckley Construction Co..... | June 7, 1901 | For improving 1.00 mile of the Windsor road (section 1) No. 57, town of Champlain, Clinton county..... | 150,000 00 | 115 | 1898 | 7,780 00 | 6,800 00 | 4,284 00 |
| E. & J. E. Martin..... | July 27, 1901 | For improving 5.03 miles of the Waterford-Mechanicville (section 2) road No. 59, town of Half Moon, Saratoga county..... | 150,000 00 | 115 | 1898 | 36,532 00 | 32,900 00 | 12,877 50 |
| Board of Supervisors of Orange County..... | June 20, 1902 | For improving 1.84 miles of the Walden-Scott's Corners road No. 64, town of Montgomery, Orange county..... | 800,000 00 | 115 | 1898 | 5,640 00 | 4,400 00 | 3,003 00 |
| Board of Supervisors of Orange County..... | June 20, 1902 | For improving 7.95 miles of the Montgomery-Goshen road No. 65, towns of Montgomery, Hamptonburgh and Goshen, Orange county..... | 800,000 00 | 115 | 1898 | 38,160 00 | 32,850 00 | 5,666 63 |
| Snell Brothers..... | May 17, 1902 | For improving 1.18 miles of the Quaker Street (section 1) road No. 73, town of Duaneburg, Schenectady county..... | 800,000 00 | 115 | 1898 | 15,963 00 | 14,500 00 | 4,676 25 |

REPORT OF STATE ENGINEER.

TABLE OF CONTRACTS PENDING ON THE EASTERN DIVISION SEPTEMBER 30, 1902—(Continued).

| NAME OF CONTRACTOR. | Date of contract. | Character of work. | Appropriation. | LEGISLATIVE ACT. | | Engineer's preliminary estimate. | Engineer's estimate at contract prices. | Payments to date. |
|--|-------------------|---|----------------|------------------|-------|----------------------------------|---|-------------------|
| | | | | Chap. | Year. | | | |
| Harry L. Smith..... | May 6, 1902 | For improving 1.5 miles of the Albion-Wyomantkill road No. 77, towns of Brunswick and North Greenbush, Rensselaer county. | \$800,000 00 | 115 | 1898 | \$12,180 00 | \$10,920 00 | \$5,241 60 |
| Bellew & Merritt Co.... | May 12, 1902 | For improving 2.46 miles of the Troy and Brunswick (section 3) road No. 84, town of Brunswick, Rensselaer county. | 800,000 00 | 115 | 1898 | 19,340 00 | 18,913 00 | 5,532 05 |
| Bellew & Merritt Co.... | May 12, 1902 | For improving 0.92 miles of the Ft. Edward-Sandy Hill road No. 85, town of Ft. Edward, Washington county. | 800,000 00 | 115 | 1898 | 8,480 00 | 7,632 00 | 7,538 75 |
| Bellew & Merritt Co.... | May 12, 1902 | For improving 2.83 miles of the Grassy Point-Sherwood's bridge (section 1) road No. 90, town of Stony Point, Rockland county. | 800,000 00 | 115 | 1898 | 24,100 00 | 21,690 00 | 162 68 |
| Eldert & Johannecht.... | May 20, 1902 | For improving 3.9 miles of the Nyack Turnpike (section 1) road No. 91, town of Ramapo, Rockland county. | 800,000 00 | 115 | 1898 | 29,990 00 | 27,100 00 | 4,268 25 |
| Bellew & Merritt Co.... | May 12, 1902 | For improving 1.74 miles of the Delmar-Slingerlands road No. 92, town of Bethlehem, Albany county. | 800,000 00 | 115 | 1898 | 17,630 00 | 15,863 00 | 3,928 09 |
| Board of Supervisors of Orange County..... | June 20, 1902 | For improving 4.67 miles of the Florida-Warwick, road No. 93, town of Warwick, Orange county. | 800,000 00 | 115 | 1898 | 29,450 00 | 25,350 00 | 10,076 63 |
| Board of Supervisors of Orange County..... | June 20, 1902 | For improving 5.86 miles of the Middletown-Goshen road No. 95, towns of Wawayanda, Wallkill and Goshen, Orange county. | 800,000 00 | 115 | 1898 | 29,710 00 | 25,575 00 | 5,754 38 |
| Bellew & Merritt Co.... | May 12, 1902 | For improving 3.61 miles of the Shunpike road No. 97, town of White Creek, Washington county. | 800,000 00 | 115 | 1898 | 26,075 00 | 23,468 00 | 6,512 37 |
| James R. Williams..... | May 26, 1902 | For improving 2.05 miles of the Barracks road No. 102, town of East Greenbush, Rensselaer county. | 800,000 00 | 115 | 1898 | 19,575 00 | 16,987 00 | ..... |
| William A. Burnham... | May 7, 1902 | For improving 1.31 miles of the Granville-Middle Granville road No. 103, town of Granville, Washington county. | 800,000 00 | 115 | 1898 | 10,175 00 | 8,998 00 | 4,049 10 |

| | | | | | | | | |
|--|---------------|--|------------|-----|------|-----------|-----------|-----------|
| Snell Brothers..... | May 17, 1902 | For improving 0.349 miles of the Quaker Street (section 2) road No. 195, town of Duanesburg, Schenectady county..... | 800,000 00 | 115 | 1898 | 2,460 00 | 2,250 00 | 168 75 |
| Snell Brothers..... | May 17, 1902 | For improving 0.132 miles of the Quaker Street (section 3) road No. 106, town of Duanesburg, Schenectady county..... | 800,000 00 | 115 | 1898 | 1,225 00 | 1,125 00 | ..... |
| Bellew & Merritt Co... | May 12, 1902 | For improving 3.66 miles of the Fultonville-Glen road No. 107, town of Glen, Montgomery county..... | 800,000 00 | 115 | 1898 | 36,940 00 | 32,740 00 | 5,647 65 |
| Bellew & Merritt Co... | May 12, 1902 | For improving 3.25 miles of the Mohawk River Turnpike (west) road No. 108, town of Amsterdam, Montgomery county..... | 800,000 00 | 115 | 1898 | 31,400 00 | 27,700 00 | 415 50 |
| Mott & Kemper..... | May 20, 1902 | For improving 2.30 miles of the Argersinger road No. 109, town of Johnstown, Fulton county..... | 800,000 00 | 115 | 1898 | 17,780 00 | 15,500 00 | ..... |
| Mott & Kemper..... | May 20, 1902 | For improving 2.25 miles of the Main street road No. 110, town of Johnstown, Fulton county..... | 800,000 00 | 115 | 1898 | 17,400 00 | 15,500 00 | ..... |
| Board of Supervisors of Orange County..... | June 20, 1902 | For improving 2.29 miles of the Cochection Turnpike (section 1) road No. 113, town of Newburg, Orange county..... | 800,000 00 | 115 | 1898 | 20,740 00 | 18,666 00 | 5,039 82 |
| Board of Supervisors of Orange County..... | June 20, 1902 | For improving 1.21 miles of the Middletown-Pine Bush (section 2) road No. 114, town of Wallkill, Orange county..... | 800,000 00 | 115 | 1898 | 4,120 00 | 3,708 00 | 2,586 33 |
| Board of Supervisors of Orange County..... | June 20, 1902 | For improving 2.62 miles of the Central Valley-Turners road No. 115, towns of Woodbury and Monroe, Orange county..... | 800,000 00 | 115 | 1898 | 19,750 00 | 17,775 00 | 9,465 19 |
| Town board of the town of Esopus..... | May 19, 1902 | For improving 4.18 miles of the Kingston-Rifton road No. 116a, town of Esopus, Ulster county..... | 800,000 00 | 115 | 1898 | 43,650 00 | 38,687 00 | 13,927 32 |
| Town board of the town of Ulster..... | May 19, 1902 | For improving 0.89 miles of the Kingston-Rifton road No. 116b, town of Ulster, Ulster county..... | 800,000 00 | 115 | 1898 | 9,050 00 | 7,413 00 | ..... |
| Town board of the town of Shandaken. | May 15, 1902 | For improving 5.09 miles of the Ulster and Delaware Turnpike (section 2) road No. 117, town of Shandaken, Ulster county..... | 800,000 00 | 115 | 1898 | 54,200 00 | 45,700 00 | 6,169 50 |
| Eldert, Johanknecht & Co..... | May 20, 1902 | For improving 4 miles of the Shandaken-Hurley road No. 118, town of Olive, Ulster county..... | 800,000 00 | 115 | 1898 | 35,350 00 | 27,584 00 | 1,034 40 |
| Thomas H. Karr..... | July 25, 1902 | For improving 3.92 miles of the Loudon (section 2) road, No. 119, town of Colonie Albany county..... | 800,000 00 | 115 | 1898 | 38,800 00 | 33,740 00 | 506 10 |

TABLE OF CONTRACTS PENDING ON THE EASTERN DIVISION SEPTEMBER 30, 1902—(Concluded).

| NAME OF CONTRACTOR. | Date of contract. | Character of work. | Appropriation. | LEGISLATIVE ACT. | | Engineer's preliminary estimate. | Engineer's estimate at contract prices. | Payments to date. |
|---------------------------|-------------------|--|----------------|------------------|-------|----------------------------------|---|-------------------|
| | | | | Chap. | Year. | | | |
| Joseph Walker | May 22, 1902 | For improving 4.14 miles of the Canajoharie-Sharon Springs road No. 120, town of Canajoharie, Montgomery county..... | \$800,000 00 | 115 | 1898 | \$38,950 00 | \$31,945 00 | \$4,791 75 |
| Bellew & Merritt Co. | May 12, 1902 | For improving 1.84 miles of the North road No. 124, town of New Scotland, Albany county..... | 800,000 00 | 115 | 1898 | 14,500 00 | 12,230 00 | 12,347 11 |

TABLE OF CONTRACTS ON EASTERN DIVISION COMPLETED DURING THE YEAR ENDING SEPTEMBER 30, 1902.

| NAME OF CONTRACTOR. | Date of contract. | Character of work. | Appropriation. | LEGISLATIVE ACT. | | Engineer's estimate of contract prices. | Final estimate. |
|--|-------------------|---|----------------|------------------|-------|---|-----------------|
| | | | | Chap. | Year. | | |
| Owego Bridge Co. | Nov. 15, 1900 | For constructing a swing bridge over the Champlain canal near Burton's saw mill in the town of Watford, Saratoga county. | \$5,000 00 | 629 | 1898 | | \$9,220 10 |
| Brummelkamp & Lane. | Nov. 1, 1900 | For improving Shinnecock and Peconic canal. | 2,000 00 | 219 | 1898 | \$10,150 00 | |
| John Dunfee & Co. | Sept. 27, 1901 | For constructing a bridge over the Champlain canal at Fulton street, Watford, Saratoga county. | 30,000 00 | 419 | 1900 | 11,710 00 | 16,569 76 |
| Reardon & Burnham. | Sept. 24, 1901 | For constructing a bridge (Green's bridge) over the Glens Falls feeder in the town of Queensbury, Warren county. | 10,000 00 | 697 | 1901 | 8,585 00 | 8,378 11 |
| | | | 6,000 00 | 423 | 1901 | 4,764 50 | 4,943 52 |
| <i>Improvement of Public Highways.</i> | | | | | | | |
| Donovan Brothers, assignees of C. H. Lutjens & Son. | May 12, 1900 | For improving 1.04 miles of the Delaware Turnpike road No. 7, town of Bethlehem, Albany county. | 150,000 00 | 115 | 1898 | 11,396 44 | 14,041 24 |
| Harry L. Smith. | July 26, 1901 | For completing the improvement of 0.6 miles of the Hastings Turnpike road No. 17, town of Greenbush, Westchester county. | 150,000 00 | 115 | 1898 | 500 00 | 1,132 00 |
| Bellew & Merritt Co. | July 26, 1901 | For completing the improvement of 3.05 miles of the Appleton Elm road No. 18, town of Greenbush, Westchester county. | 150,000 00 | 115 | 1898 | 18,500 00 | 19,079 70 |
| Daniel Murray. | July 23, 1900 | For improving 2.80 miles of the Mamaroneck-White Plains road No. 19, town of Scarsdale, Westchester county. | 150,000 00 | 115 | 1898 | 23,160 00 | 23,951 51 |
| George H. Smith. | Sept. 11, 1901 | For completing the improvement of 3.77 miles of the White Plains-Armok road No. 20, town of Northeast, Westchester county. | 150,000 00 | 115 | 1898 | 12,767 62 | 12,767 62 |
| Thomas H. Karr. | June 25, 1900 | For improving 3.41 miles of the London road No. 22, town of Colonie, Albany county. | 150,000 00 | 115 | 1898 | 27,400 00 | 32,615 00 |
| Town board of the town of North Greenbush. | June 20, 1901 | For improving 2.59 miles of the Troy and Greenbush (section 2) road No. 26, town of North Greenbush, Rensselaer county. | 150,000 00 | 115 | 1898 | 19,430 20 | 20,242 95 |
| Snell Brothers. | June 5, 1901 | For improving 2.65 miles of the Amsterdam and Minaville road No. 32, town of Florida, Montgomery county. | 150,000 00 | 115 | 1898 | 15,800 16 | 15,860 16 |

TABLE OF CONTRACTS ON EASTERN DIVISION COMPLETED DURING YEAR ENDING SEPTEMBER 30, 1902—(Con.)

| NAME OF CONTRACTOR. | Date of contract. | Character of work. | Appropriation. | LEGISLATIVE ACT. | | Engineer's estimate of contract prices. | Final estimate. |
|---|-------------------|---|----------------|------------------|-------|---|-----------------|
| | | | | Chap. | Year. | | |
| McCabe & Duffy..... | May 31, 1901 | For improving 2.16 miles of the Ardley-Elmsford (section 2) road No. 34, towns of Greenburgh and Mt. Pleasant, Westchester county..... | \$150,000 00 | 115 | 1898 | \$18,940 00 | \$18,940 00 |
| Eldert & Johannecht..... | July 22, 1901 | For improving 3.21 miles of the White Plains-Armonk (section 2) road No. 35, town of North-castle, Westchester county..... | 150,000 00 | 115 | 1898 | 22,800 00 | 22,800 00 |
| Edgar Snyder & Co., Jacob D. Wurta, receiver..... | June 10, 1901 | For improving 4.00 miles of the Saugerties-Woodstock (section 1) road No. 37, town of Woodstock, Ulster county..... | 150,000 00 | 115 | 1898 | 19,910 00 | 20,660 31 |
| E. & J. E. Martin..... | July 27, 1901 | For improving 1.51 miles of the Waterford-Mechanicville (section 1) road No. 39, town of Waterford, Saratoga county..... | 150,000 00 | 115 | 1898 | 10,700 00 | 11,212 00 |
| Callanan Road Improvement Co..... | June 5, 1901 | For improving 2.74 miles of the Delaware turn-pike (section 2) road No. 41, town of Bethlehem, Albany county..... | 150,000 00 | 115 | 1898 | 20,260 00 | 20,435 00 |
| Board of Supervisors of Orange county..... | June 18, 1901 | For improving 11.00 miles of the Newburg-Woodbury road No. 42, towns of New Windsor, Cornwall and Woodbury, Orange county..... | 150,000 00 | 115 | 1898 | 20,247 20 | 20,247 20 |
| Board of Supervisors of Orange county..... | June 18, 1901 | For improving 7.55 miles of the Cochecton turn-pike road No. 43, towns of Newburgh and Mont-gomery, Orange county..... | 150,000 00 | 115 | 1898 | 20,789 80 | 20,789 80 |
| Board of Supervisors of Orange county..... | June 18, 1901 | For improving 4.22 miles of the Goshen-Florida road No. 44, towns of Goshen and Warwick, Orange county..... | 150,000 00 | 115 | 1898 | 8,757 30 | 8,757 30 |
| Board of Supervisors of Orange county..... | June 18, 1901 | For improving 9.25 miles of the Middletown-Pine Bush road No. 45, towns of Crawford and Walkill, Orange county..... | 150,000 00 | 115 | 1898 | 12,467 80 | 12,467 80 |
| McCabe & Duffy..... | May 31, 1901 | For improving 3.69 miles of the Unionville-McKeel's Corners road No. 52, town of Mt. Pleasant, Westchester county..... | 150,000 00 | 115 | 1898 | 26,870 00 | 26,870 00 |
| McCabe & Duffy..... | May 31, 1901 | For improving 1.76 miles of the McKeel's Corners-Briar Cliff Manor road No. 53, towns of Ossining and Mt. Pleasant, Westchester county..... | 150,000 00 | 115 | 1898 | 12,644 00 | 12,644 00 |

| | | | | | | | |
|---|---------------|---|------------|-----|------|-----------|-----------|
| Thomas H. Karr..... | July 16, 1901 | For improving 3.15 miles of the Hoag's Corners-Troy Turnpike road No. 55, town of Nassau, Rensselaer county..... | 150,000 00 | 115 | 1898 | 9,450 00 | 9,795 00 |
| Prescott & Buckley Construction Co..... | June 7, 1901 | For improving 2.82 miles of the Plattsburg-Keeseville (section 1) road No. 56, town of Champlain, Clinton county..... | 150,000 00 | 115 | 1898 | 16,900 00 | 17,070 81 |
| Reardon & Burnham..... | June 4, 1901 | For improving 6.06 miles of the Saratoga-Glens Falls road No. 58, town of Moreau, Saratoga county..... | 150,000 00 | 115 | 1898 | 31,000 00 | 31,330 00 |
| Snell Brothers..... | May 17, 1902 | For improving 0.644 miles of the Amsterdam-Minaville (section 2) road No. 96, town of Florida, Montgomery county..... | 800,000 00 | 115 | 1898 | 6,400 00 | 6,400 00 |
| Pellev & Merritt Co..... | May 12, 1902 | For improving 1.25 miles of the Granville-Troy Stage road No. 104, town of Granville, Washington county..... | 800,000 00 | 115 | 1898 | 9,765 00 | 9,837 96 |

REPORT
OF THE
DIVISION ENGINEER
OF THE
MIDDLE DIVISION
NEW YORK STATE CANALS

For the Fiscal Year Ending September 30, 1902.

MIDDLE DIVISION.

SYRACUSE, N. Y., October 1, 1902.

HON. EDWARD A. BOND, *State Engineer and Surveyor, Albany, N. Y.*:

SIR.—I have the honor herewith to submit my annual report for the fiscal year ending September 30, 1902, covering items required to be embodied in your annual report to the Legislature, as provided in section 7, article IV, chapter 338, Laws of 1894.

Table No. 1, hereto annexed, shows the names of the engineers duly appointed by the State Engineer and Surveyor, time employed, rate of compensation and amount paid during the year, with the amount of other miscellaneous expenditures, for ordinary repairs, extraordinary repairs, improvement of public highways, special appropriations and special surveys.

Table No. 2 exhibits contracts in force under special appropriations at the close of the fiscal year, together with engineer's preliminary estimate of cost, engineer's estimate at contract prices, and payments to September 30, 1902, for each piece of work and amount paid thereon.

Table No. 3 exhibits contracts under special appropriations, completed and settled during the fiscal year, showing appropriations, engineer's estimate at contract prices and final account.

Table No. 4 exhibits contracts for the improvement of public highways in force, showing engineer's preliminary estimate, engineer's estimate at contract prices and payment to September 30, 1902.

Table No. 5 exhibits statement of contracts for the improvement of public highways completed and settled during the fiscal year, engineer's preliminary estimate, engineer's estimate at contract prices and final account.

Table No. 6 exhibits water record of Cayuga and Cross Lakes and Seneca River, taken tri-annually.

ORDINARY REPAIRS.

No work has been done upon this division the past year by contract from ordinary repair funds, but the force of the department has been often called upon for plans, estimates, maps and specifications to meet requirements of the Superintendent of Public Works, under section 8, article III, chapter 338, Laws of 1894; also in accordance with section 52, article IV of said chapter, to "make to the State Engineer and to the Superintendent of Public Works or the Assistant Superintendent in special charge of the division and to the Superintendent of Repairs, such suggestions in relation to repairs and the plan of making the same as will, in his judgment, most tend to the safe and economical navigation of the canals."

Two breaks have occurred during the present season of navigation, the repairs of which have required the attention of this department. First, during the night of July 28th, a break occurred in the berme bank of the Black River canal just above lock No. 13, at the viaduct constructed by the Rome and Black River Railroad Company, about the year 1850. The structure is of stone abutments, of very poor quality of masonry, carrying a wood trunk for prism of canal. This railroad was never completed, but the structure was left to the care of the State to keep in repair without any necessity for a structure of any kind at that place. The repair of the break was completed August 7th, and navigation resumed on August 9th. This old viaduct is of no use, and in order to secure the canal at that point against a recurrence of trouble experienced this season, I urgently advise that the structure be at once removed and an earth bank built upon the tow-path side, allowing water to flow back in the ravine on the berme side. This disposition of the old structure will relieve the State from cost of repairs from breaks as well as maintaining the wooden trunk. The cost of the work proposed will be much less than was expended to repair the break, and should be done during close of navigation the coming winter.

Second. On September 14th a serious break occurred at the double arch culvert of 25 feet span across Oneida Creek at Dur-

hamville. This structure was built in 1840, under one of the first contracts for the enlargement of the Erie canal, and it is not known that there has ever been a break or an intimation of danger at that structure, but from some unknown cause, water from the canal prism near the center of the canal, found its way down in rear of and under the west abutment between foundation timbers and raising the three-inch floor plank (as there was no concrete between foundation timbers), the water under a head of nearly thirty feet, soon removed the earth from under foundation to sufficient extent (about 150 cubic yards) to permit foundation to settle about one foot, thereby allowing the masonry to settle and opening joints sufficient to allow the entire wall, seven feet in height up to the skew-back and thirty-five feet in length, to be carried into the culvert, through which opening some 7,000 cubic yards of embankment was carried into the creek before the water was drawn from the level, sixty miles in length. Fortunately the arch stood without being sustained by the abutment, although it settled somewhat out of shape. It was secured by constructing concrete abutments in place of masonry carried away, the space under foundation was filled with concrete, the embankment restored and the inside slopes protected temporarily with timber and plank. The repairs were continued day and night and water let in over the break September 23d at 9 o'clock A. M.

While, under the law, the duties of this department are only advisory, yet your Division Engineer is happy to state that his suggestions and advice in repair of breaks has always been received and acted upon by the Superintendent of the Public Works Department in good faith for the best interests of the State.

While the repairs of these breaks, as is always the case, were made with a view of restoring navigation at the earliest time possible by working night and day with the largest force obtainable, less attention is paid to the quality of the work than the date of filling the prism, having always in view sufficient stability in the work to carry it at least through the navigation season.

While the repairs of this structure were hastily made, the materials used were of the best quality that could be obtained, and

the work was done as well as was possible under the hurried conditions always incident to repairing breaks. It is believed that if no leaks are developed before the close of navigation, it may be thought wise to make a careful investigation by the Superintendent of Public Works Department in conjunction with the State Engineer's Department, with a view of deciding as to the advisability of substantial rebuilding of the arch and west abutments now, or delaying the work until the future policy of the Legislature in relation to the canals is finally determined.

AQUEDUCT OVER ONONDAGA CREEK, IN THE CITY OF SYRACUSE.

It has been known for two or three years that there was a small leak from the prism just west of the aqueduct at Syracuse, which caused a settlement of the earth in the tow-path bank; a careful examination was made each spring, but the direction of the stream was not discovered until the forces of Superintendent of Public Works were cleaning out the arches during the past summer, when quite a stream was found to pass under the west abutment and into the arch, exactly as was the case at Oneida Creek Aqueduct, which in that case finally developed into a break of serious magnitude. As the stream, when discovered, passed only clear water, it was decided to keep close watch to see if flow of water is increased, in hopes that navigation may be continued uninterruptedly to the close of the season. During the coming winter or spring, before opening of navigation, proper repairs should be made so as to put this structure beyond any possibility of further trouble. This structure, like the aqueduct at Durhamville, at which the break occurred in September last, was built prior to 1842, and, although the character of the work appears to have been of superior quality, yet, after its continual use for sixty years, weakness is developed, showing that the utmost care of the old structures should be exercised by the officers in charge of maintenance of navigation.

CULVERT No. 1 AT UTICA.

On September 18th, while the water was out of the prism of the Erie canal owing to the repairing of the break at Durhamville,

a reservoir of the Utica water-works broke away, allowing the whole body of water to flow down the ravine through the city of Utica to Starch Factory culvert No. 1, which has three small arches crossing the Erie canal. The culvert, not having capacity to pass the flood of water, soon became partially clogged with debris and the banks were overflowed, and a large amount of material washed into the prism of the canal. Temporary repairs were promptly made and no delay to navigation was experienced beyond that required to repair the break at Durhamville.

This culvert is in a precarious condition and should be thoroughly repaired or rebuilt before opening of navigation next spring. The character and extent of repairs needed can only be determined after stripping the masonry.

EXTRAORDINARY REPAIRS.

Under the above head is classed all work done in pursuance of special laws by contract during the fiscal year, a brief description of which piece of work follows.

Contracts in force September 30, 1902. (See Table No. 2.)

GUARD LOCK AND GATES AT SENECA LAKE OUTLET.

John R. Y. Craigie and Stephen Maggio, contractors.

Act, chapter, 680, Laws of 1900, and act, chapter 616, Laws of 1902.

Appropriation, \$97,000.

Work under this contract, dated September 12, 1900, has been continued at a very moderate speed during the year, and it is believed that the contract will be completed by December 1st.

Water in Seneca Lake has remained so high throughout the past season that the controlling gates would not have been brought into use had the work been completed. Only in dry seasons will the usefulness of the structure be realized. (See Division Engineer's report for 1900 and 1901, for description of this structure, and also an illustration accompanying this report.)

**EXCAVATING AND DEEPENING THE HARBOR AND CHANNEL AND THE
ENTRANCE AT THE FOOT OF CANANDAIGUA LAKE.**

William H. Welch, contractor.

Act, chapter 218, Laws of 1900.

Acts, chapters 594 and 616, Laws of 1902.

Appropriation, \$10,000.

Dredging under this contract, dated October 4, 1900, has been in progress during the past summer and it is expected that the entire channel will be opened before the lake is closed by ice.

This improvement is of considerable local importance and will greatly benefit the commerce upon Canandaigua Lake.

**BRIDGE OVER BLACK RIVER AT PRATT'S LANDING, BETWEEN THE
TOWNS OF TURIN AND GREIG, LEWIS COUNTY.**

American Bridge Company, contractors.

Act, chapter 670, Laws of 1900.

Act, chapter 645, Laws of 1901.

Act, chapter 594, Laws of 1902.

Appropriation, \$20,000.

Work under this contract, dated August 8, 1901, has been in progress this season since water in the river subsided sufficiently to permit the erection of masonry, and at close of fiscal year is well toward completion. By December 1st next, a proper crossing of the river between the towns of Turin and Greig will be provided, and a suitable swing span to permit passage of boats will be completed, as provided by law.

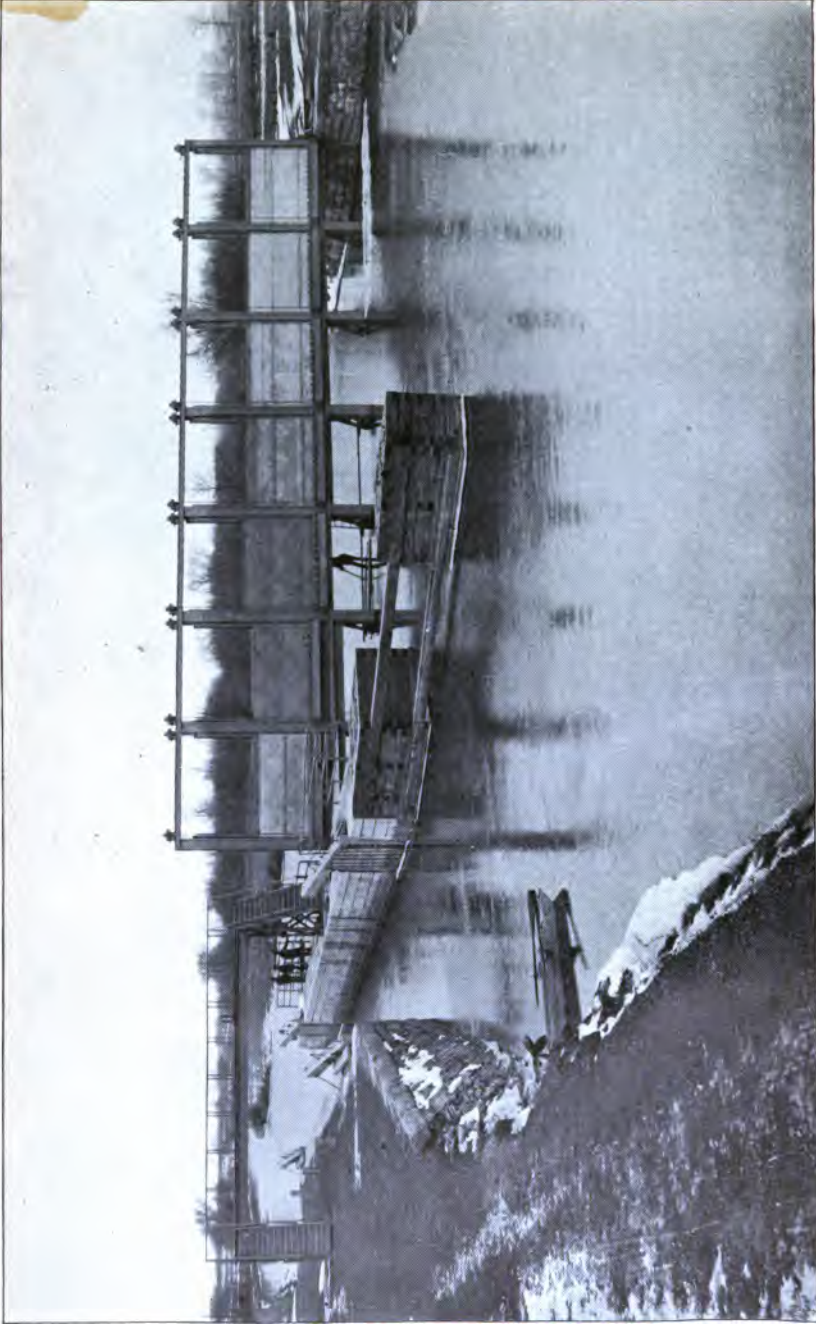
STEEL BULKHEAD AT BATTLE ISLAND DAM, OSWEGO RIVER.

Battle Island Paper Company, contractor.

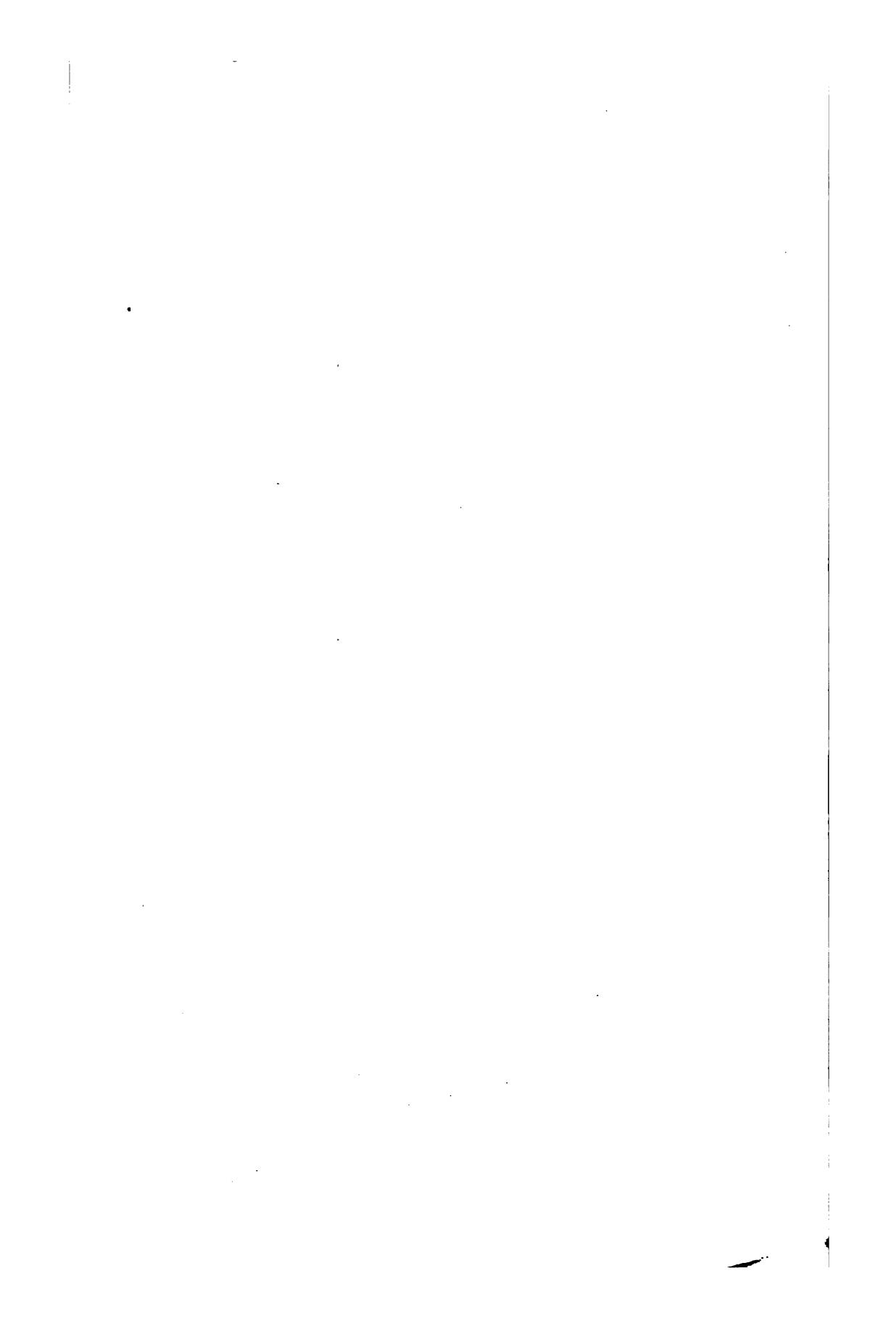
Act, chapter, 594, Laws of 1902.

Appropriation, \$6,600.

The work provided for under this contract consists of removing the old timber bulkhead upon the west side of the river and reconstructing of steel in accordance with plans of modern construction to meet the necessities of the paper company, which is erecting a power plant at west end of the dam.



SENECA LAKE GUARD-LOCK AND CONTROLLING-WORKS.
Looking N. E. from the Lake, downstream; showing gates open, giving free outlet during high water.
Built under chapter 680, Laws of 1900. Completed January 1903.



The work is nearly completed and final account will be prepared before December first.

RAISING AND COMPLETING HIGH DAM, OSWEGO RIVER.

Walter Bradley & Company, contractors.

Act, chapter 645, Laws of 1901, and act, chapter 594, Laws of 1902.

The work proposed to be done under this contract is to complete the raising of the spillway of the dam to the height proposed under chapter 79, Laws of 1895, the stone for which were delivered and paid for under the contract of John Kelly & Company. There has been no work done under this contract owing to continued high water in the river throughout the past season.

RAISING AND COMPLETING MINETTO DAM, OSWEGO RIVER.

Walter Bradley & Company, contractors.

Act, chapter 645, Laws of 1901, and act, chapter 594, Laws of 1902.

The work to be done under this contract is similar to that described above at High Dam. There has been nothing done under this contract.

RAISING CARTHAGE BRIDGE, BLACK RIVER.

J. T. Campbell, contractor.

Act, chapter 594, Laws of 1902.

Appropriation, \$1,000.

The several spans constituting this bridge are to be raised, commencing at nothing at the east end and raising each pier with masonry sufficiently to make a true grade to the roadway to a point three and one-half feet above its present elevation at the westerly end, and the construction of necessary masonry, and repair approaches in a proper and workmanlike manner.

This contract will be completed and final account rendered by December first.

DAM ACROSS BLACK RIVER AT FORESTPORT, N. Y.

Walter Bradley & Company, contractors.

Act, chapter 420, Laws of 1902.

Appropriation, \$45,000.

The old timber dam at Foresport used to divert the waters of the Black river into the feeder, has become so much decayed and dilapidated that, after careful investigation, it was decided that as a supply of water to maintain navigation upon the Erie canal depended upon this dam, which was liable to be carried away at any time, its further use without providing for a stable structure would be extremely unwise. It was decided to build, just below the old structure, a substantial stone dam that will, when completed, insure the canal against the loss, for an indefinite period, of water from the reservoirs in the North Woods.

The work was put under contract June thirteenth last, and the masonry is so far completed that it is safe to predict its completion by January first next.

DAM ACROSS ST. REGIS RIVER AT BRASHER FALLS, N. Y.

B. P. Clark, contractor.

Act, chapter 645, Laws of 1901.

This is a timber structure filled with stone, founded upon a river bottom composed of large and small boulders and sand. An apron is built as part of the foundation to prevent scour below the dam. It was believed that the conditions rendered it necessary to sink the foundations into the river bed and fasten the structure securely thereto, and the original plans were so made. The contractor commenced the work without notice to the Engineer Department and carried it on for a month without supervision. It was found upon the first examination that the foundations had been placed over three and one-half feet above the grade elevation shown upon the plan.

An examination of the situation on August 27, 1902, by Mr. William Pierson Judson, Deputy State Engineer, led him to the conclusion that the structure could be made by special treat-

ment, to be as safe as originally planned. A special agreement was made with the contractor requiring him to do all the work under the modified plan without increased cost to the State.

BRIDGE AT SOUTH JAMES STREET, ROME, N. Y.

Owego Bridge Company, contractors.

Act, chapter 614, Laws of 1902.

Appropriation, \$22,000.

This contract provides for a steel overhead bridge across the Erie canal at Rome, to replace an old cast-iron Whipple arch truss bridge, which has been condemned for electric street car traffic for some time.

It is expected the new superstructure will be erected before navigation opens next spring.

CONTRACTS COMPLETED AND SETTLED.

(See Table No. 3.)

BRIDGE OVER SENECA RIVER NEAR RUMSEY STREET, SENECA FALLS.

American Bridge Company, contractors.

Act, chapter 324, Laws of 1899, and act, chapter 396, Laws of 1900.

Appropriation, \$8,000.

Final account, \$6,148.83.

This bridge cannot be brought into use until approaches at either end are constructed, for which there is no provision in law, and it is understood that the village of Seneca Falls will provide necessary approaches.

CONSTRUCTING AND EXTENDING TOW-PATH AT GENEVA, N. Y.

A. F. Chapman & Company, contractors.

Act, chapter 662, Laws of 1900.

Appropriation, \$45,000.

Final account, \$31,335.16.

This extension of tow-path across the harbor at Geneva will add much to the dock facilities at Geneva, and when the space

between the old shore line and the new dock is filled, it will add a large area and value to the property within the blue line, besides removing stagnant water, now a menace to the health of the city.

REPAIRING AND REBUILDING RETAINING WALLS, ETC., LIBERTY STREET BRIDGE AT PENN YAN, N. Y.

Marson & Ryan, contractors.

Act, chapter 681, Laws of 1901.

Appropriation, \$2,400.

Final account, \$2,114.13.

The work done under this contract consisted of constructing concrete abutment and extending and raising retaining walls at north end of the bridge.

LIFT-BRIDGE AT SCHUYLER STREET, UTICA, N. Y.

Havana Bridge Works, contractors.

Act, chapter 427, Laws of 1898, and act, chapter 417, Laws of 1900.

Appropriation, \$18,000.

Final account, \$10,517.79.

LIFT-BRIDGE AT WASHINGTON STREET, UTICA, N. Y.

Havana Bridge Works, contractors.

Act, chapter 397, Laws of 1898; act, chapters 402 and 597, Laws of 1900.

Appropriation, \$27,000.

Final account, \$23,107.42.

LIFT-BRIDGE AT CATHERINE AND ALMOND STREETS, SYRACUSE, N. Y.

Havana Bridge Works, contractors.

Act, chapter 424, Laws of 1898, and act, chapter 547, Laws of 1900.

Appropriation, \$23,000.

Final account, \$20,654.42.

The three structures above named are steel lift-bridges upon line of street indicated, each upon plan suited to the location and have all been in use during the past season of navigation, giving entire satisfaction.

BRIDGE AT BRAINARD STREET, WHITESBORO, N. Y.

American Bridge Company, contractors.

Act, chapter 625, Laws of 1899, and act, chapter 428, Laws of 1901.

Appropriation, \$2,000.

Final account, \$1,538.66.

This is a steel foot-bridge to accommodate the people upon either side of the Erie canal at Whitesboro.

IMPROVEMENT OF PUBLIC HIGHWAYS.

ACT, CHAPTER 115, LAWS OF 1898.

The report of work done upon the Middle Division, comprising the fifteen counties of central New York, is herewith presented.

Since the date of the last report 60 petitions, aggregating 255.⁰⁵⁹ miles, for the improvement of highways in the Middle Division, have been approved for survey by the State Engineer.

Surveys for 39 in number (111.¹¹ miles) have been made, and plans made and approved by the State Engineer for 12 in number (17.⁸⁴ miles).

Contracts have been entered into for 12 in number (22.⁹⁹⁹ miles) and work has been prosecuted upon 10 in number (20.⁹⁹⁹ miles).

Two contracts left over from last season were completed, and two contracts entered into which were not commenced.

An exceptionally rainy season has so interfered with the work that it is probable that but 11.39 miles will be completed, and only 4 contracts closed. That the season has been wet is unfortunate, since the attempt to secure good work has been most discouraging, both to Engineer and contractor. Had the weather been fair, there is no good reason why all of the contracts upon this division should not have been completed. The amount of loss is therefore represented by the percentage of work remaining incomplete at the close (46 per cent).

Several experiences have demonstrated very forcibly that a dry, firm sub-grade is a necessary requisite for a 6-inch macadam road, and that such a road cannot be successfully laid in mud.

The completed roads upon this division heretofore passed to the several counties for care and maintenance are Cortland street and James street, Onondaga county; Deerfield and Sauquoit Creek, Oneida county, and Chenango River, Broome county.

During the past season but little work has been required to maintain these roads. They have remained, except in a few

isolated instances, in as good condition as when first completed.

There are hereto appended tabular statements which give in detail the information relative to progress and existing conditions of the highway improvement work upon this division.

Road improvement to September 30, 1902.

Contracts made during fiscal year.

Contracts in force at close of fiscal year.

Contracts completed and settled during the fiscal year.

Recapitulation of work done to September 30, 1902.

ROAD IMPROVEMENT TO SEPTEMBER 30, 1902.

| Petition number. | Road number. | NAME OF ROAD. | State of progress. | Surveyed miles. |
|--------------------------|--------------|---|-----------------------|-----------------|
| <i>Broome County.</i> | | | | |
| 134 | 47 | Chenango River | Construction finished | 1.750 |
| 142 | 125 | Lestershire | Under construction | 2.955 |
| 148 | 126 | Town Line extension | Plans completed | 1.970 |
| 149 | 134 | Fenton | Plans completed | 2.170 |
| 160 | 127 | Bark Bridge | Plans completed | 2.040 |
| 200 | | Bridge | Survey made | 1.004 |
| 267 | 174 | Endicott | Plans completed | 2.170 |
| 268 | | Glen Castle | Survey made | 0.570 |
| 276 | | Center Village | Plans completed | 0.574 |
| 312 | | Nineveh | Plans completed | 0.934 |
| 367 | | Harpersville | Plans completed | 0.850 |
| 314 | | Quaquaga | Plans completed | 1.010 |
| 315 | 175 | Chenango towpath | Plans completed | 1.836 |
| 316 | | Deposit | Survey made | 2.784 |
| 317 | | Gulf Bridge, section 1 | Survey made | 1.750 |
| 318 | | Tunnel | Survey made | 1.703 |
| 346 | | Colesville | Petition filed | 3.00 |
| 349 | | River road, Kirkwood | Petition filed | 2.50 |
| 350 | | Union-Maine, section 1 | Survey made | 3.036 |
| 351 | | Elliott | Petition filed | 0.331 |
| 352 | | Binghamton-Conklin, section 1 | Petition filed | 2.500 |
| 353 | | Big Snake Creek | Petition filed | 1.33 |
| 354 | | River road, Windsor, section 1 | Plans 95% completed | 1.868 |
| 355 | | River road, Windsor, section 2 | Plans 95% completed | 2.828 |
| 356 | | Castle Creek | Petition filed | 4.50 |
| 357 | | Chenango Bridge | Petition filed | 4.00 |
| 358 | | Union Center | Petition filed | 2.75 |
| 359 | | Union-Maine, section 2 | Petition filed | 0.50 |
| 261 | | Riverside Drive | Petition filed | 2.00 |
| 262 | | Trim street, Kirkwood | Petition filed | 4.00 |
| 263 | | Bridge River | Petition filed | 2.75 |
| 264 | | Binghamton-Conklin, section 2 | Petition filed | 4.00 |
| 266 | | Valonia Springs | Petition filed | 1.75 |
| 268 | | Gulf Bridge, section 2 | Petition filed | 4.00 |
| 269 | | Glen Aubrey, section 1 | Petition filed | 3.00 |
| 270 | | Glen Aubrey, section 2 | Petition filed | 2.00 |
| 271 | | Hawleyton turnpike, section 1 | Petition filed | 4.00 |
| 272 | | Hawleyton turnpike, section 2 | Petition filed | 4.00 |
| 273 | | | | |
| <i>Cayuga County.</i> | | | | |
| 226 | | Owasco | Plans completed | 2.19 |
| <i>Chenango County.</i> | | | | |
| 119 | 112 | Norwich-Plymouth | Under construction | 4.840 |
| 278 | | Rockdale | Plans 50% completed | 1.810 |
| 279 | | Guilford | Plans 50% completed | 1.720 |
| 280 | | Mount Upton | Plans 95% completed | 3.690 |
| 281 | | Greene-Smithville Flats | Plans 75% completed | 4.680 |
| 282 | | Oxford-McDonough | Survey made | 5.820 |
| 283 | | | | |
| <i>Cortland County.</i> | | | | |
| 93 | 40 | Cuyler | Construction finished | 0.47 |
| 161 | 111 | Blodgett's Mills | Under construction | 0.750 |
| 236 | 123 | Preble-Homer | Under construction | 1.230 |
| 250 | | Cortland-Homer | Plans 95% completed | 0.543 |
| 292 | | Dryden | Plans 25% completed | 2.000 |
| <i>Jefferson County.</i> | | | | |
| 265 | 147 | Burrs Mills | Plans completed | 3.920 |
| 272 | 185 | State road | Plans 25% completed | 1.000 |
| 339 | 183 | Adams-Henderson, section 1 | Plans 25% completed | 3.030 |
| 339 | | Adams-Henderson, section 2 | Survey made | 6.908 |
| 340 | 181 | Watertown, Sacketts Harbor and Henderson, section 1 | Plans 25% completed | 6.040 |
| 340 | | Watertown, Sacketts Harbor and Henderson, section 2 | Survey made | 2.257 |
| 341 | | Sacketts Harbor | Plans 25% completed | 1.455 |
| 342 | 182 | Redwood-Alexandria Bay, section 1 | Plans 25% completed | 2.976 |

ROAD IMPROVEMENT TO SEPTEMBER 30, 1902 — (Concluded).

| Petition number. | Road number. | NAME OF ROAD. | State of progress. | Surveyed miles. |
|--------------------------------------|--------------|--|-------------------------|-----------------|
| <i>Jefferson County—(Concluded).</i> | | | | |
| 342 | ..... | Redwood-Alexandria Bay, section 2..... | Survey made..... | 4.183 |
| 343 | 186 | Depot..... | Plans 25% completed.. | 1.028 |
| 344 | 184 | Pierrepont Manor-Ellisburg..... | Plans 25% completed.. | 2.955 |
| 345 | ..... | Henderson Harbor..... | Plans 25% completed.. | 5.085 |
| <i>Madison County.</i> | | | | |
| 140 | ..... | Oneida Community..... | Project abandoned.... | ..... |
| <i>Oneida County.</i> | | | | |
| 9 | 3 | Deerfield..... | Construction finished.. | 2.250 |
| 67 | 71 | Utica-Paris..... | Under construction.... | 5.200 |
| 91 | 21 | Sauquoit Creek..... | Construction finished.. | 1.330 |
| 92 | ..... | Whitesboro-Carey's Corners..... | Project abandoned.... | ..... |
| 173 | 139 | Hamilton Bridge..... | Plans completed..... | 1.290 |
| 174 | 140 | Seneca turnpike..... | Plans completed..... | 2.280 |
| 319a | ..... | Utica-Oneida Castle, section 1..... | Plans 90% completed.. | 9.078 |
| 319a | ..... | Utica-Oneida Castle, section 2..... | Survey made..... | 8.492 |
| 319b | ..... | County road..... | Petition filed..... | 47.0 |
| 319c | ..... | County road..... | Petition filed..... | 48.0 |
| <i>Onondaga County.</i> | | | | |
| 10 | ..... | Coleman Hill..... | Plans completed..... | 1.890 |
| 11 | 8 | Cortland street..... | Construction finished.. | 1.200 |
| 12 | 9 | James street..... | Construction finished.. | 0.580 |
| 60 | 74 | Marcellus-Marietta..... | Under contract..... | 1.000 |
| 61 | 76 | LaFayette..... | Under construction.... | 1.000 |
| 66 | ..... | Jamesville..... | Plans completed..... | 0.750 |
| 79 | ..... | Dewitt..... | Plans completed..... | 1.760 |
| 80 | 122 | East Lake, Skaneateles..... | Under contract..... | 1.000 |
| 81 | 48 | West Lake, Skaneateles..... | Under construction.... | 1.000 |
| 94 | 49 | Fabius-Apulia, section 1..... | Under construction.... | 2.000 |
| 184 | 75 | Fabius-Apulia, section 2..... | Under construction.... | 0.864 |
| 233 | 121 | Fabius-Apulia, section 3..... | Under construction.... | 1.160 |
| 247 | 132 | Genesee turnpike..... | Plans completed..... | 1.130 |
| <i>Oswego County.</i> | | | | |
| 114 | ..... | West Oswego River..... | Plans completed..... | 2.480 |
| 254 | ..... | Oswego-Sterling..... | Plans completed..... | 1.660 |
| <i>St. Lawrence County.</i> | | | | |
| 74 | ..... | Norwood-Norfolk..... | Plans completed..... | 3.33 |
| 151 | ..... | Childwood Park-Tupper Lake..... | Plans completed..... | 5.890 |
| <i>Tompkins County.</i> | | | | |
| 141 | 72 | Catskill turnpike, section 1..... | Plans completed..... | 1.870 |
| 271 | ..... | Catskill turnpike, section 2..... | Plans completed..... | 1.380 |

REPORT OF STATE ENGINEER.

ALL ROADS FOR WHICH CONTRACTS HAVE BEEN MADE UNDER CHAP. 115, LAWS OF 1898, FROM
SEPTEMBER 30, 1901, TO SEPTEMBER 30, 1902.

| Road No. | NAME OF ROAD. | County. | Petition No. | Date of contract. | Length in miles. | Width of macadam. | Width of roadway. | Cubic yards excavated per mile. | KIND OF STONE. | | Per cent completed to Oct. 1st, 1902. | Engineer's estimate. | Total cost completed. | Total cost per mile |
|----------|---------------------------------|-----------|--------------|-------------------|------------------|-------------------|-------------------|---------------------------------|-----------------------------|----------------------------------|---------------------------------------|----------------------|-----------------------|---------------------|
| | | | | | | | | | Bottom. | Top. | | | | |
| 71 | Utica-Paris..... | Oneida... | 67 | May 6, 1902 | 5.20 | 16 | 24 | 4231 | Limestone and conglomerate. | Trap rock | 20 | \$47,200 00 | ..... | ..... |
| 74 | Marcellus-Marietta... | Onondaga. | 60 | June 18, 1902 | 1.00 | 12 | 18 | Emb. 6918 | Limestone | Limestone | 0 | 9,200 00 | ..... | ..... |
| 75 | Fabius-Apulia, Sec. 2. | Onondaga. | 184 | May 17, 1902 | 0.864 | 16 | 22 | Emb. 3939 | Limestone | Limestone | 21 | 8,800 00 | ..... | ..... |
| 76 | LaFayette..... | Onondaga. | 61 | May 17, 1902 | 1.00 | 16 | 24 | 3855 | Limestone | Limestone | 52 | 8,000 00 | ..... | ..... |
| 111 | Blodgett's Mills..... | Cortland. | 161 | May 23, 1902 | 0.75 | 12 | 20 | 4400 | Local quarried sandstone. | Limestone | 25 | 6,100 00 | ..... | ..... |
| 112 | Norwich-Plymouth... | Chenango. | 119 | May 20, 1902 | 4.84 | 12 | 20 | 3926 | Local quarried sandstone. | Trap rock. | 49 | 39,900 00 | ..... | ..... |
| 121 | Fabius-Apulia, Sec. 3. | Onondaga. | 233 | May 17, 1902 | 1.16 | 16 | 22 | 2099 | Limestone | Limestone | 76 | 9,950 00 | ..... | ..... |
| 122 | East Lake (at Skaneateles)..... | Onondaga. | 80 | June 18, 1902 | 1.00 | 16 | 24 | 2881 | Limestone | Limestone | 0 | 9,200 00 | ..... | ..... |
| 123 | Preble-Homer..... | Cortland. | 236 | May 29, 1902 | 1.23 | 12 | 20 | 2407 | Fieldstone. | Limestone and quartz fieldstone. | 48 | 8,700 00 | ..... | ..... |
| 125 | Lesterahire..... | Broome... | 148 | July 2, 1902 | 2.955 | 16 | 22 | 2902 | Fieldstone. | Trap rock | 47 | 28,500 00 | ..... | ..... |

CONTRACTS IN FORCE AT THE CLOSE OF THE FISCAL YEAR.

(See Table No. 4.)

WEST LAKE ROAD No. 48, ONONDAGA COUNTY.

Length, 1 mile.

Width of macadam, 16 feet.

Engineer's estimate of total cost, \$9,100.

Percentage of work done, September 30th, 83.

Contractors, Charley & Cuddeback.

A road leading south along the west side of Skaneateles Lake, south of Skaneateles village. It sustains a fairly heavy traffic from a farming district.

The base consists of crushed field stone, bound with sand screenings, and the top of limestone from Glenside quarries about four miles north of Skaneateles village.

The natural soil is of clay and clay loam, and the rainy season has greatly retarded progress. It will be completed this season.

FABIUS AND APULIA SECTION 1, ROAD No. 49, ONONDAGA COUNTY.

Length, 2 miles.

Width of macadam, 16 feet.

Engineer's estimate of total cost, \$17,900.

Percentage of work done, September 30th, 15.

Contractor, John Dunfee & Company.

Part of a road leading from Apulia Station to the village of Fabius, the central section of three. A change in line was made to avoid a high hill. The contractors commenced the work of grading upon the new line, and nearly finished it. The rainy season so interfered with the placing of stone, however, that the work was abandoned for the year.

The bottom course is to consist of local quarry stone bound with sand, and the top of hard limestone furnished by the Onondaga County Penitentiary plant at Jamesville. The screenings of the top course are limestone produced in crushing stone for the top course.

UTICA AND PARIS ROAD No. 71, ONEIDA COUNTY.

Length, 5.20 miles.

Width of macadam, 16 feet.

Engineer's estimate of total cost, \$47,200.

Percentage of work done, September 30th, 20.

Contractor, board of supervisors, County of Oneida.

This road is part of the so-called Bridgewater turnpike leading south from the south line of the city of Utica through the unincorporated villages of Washington Mills, Willowvale and Chadwicks, to the line between the towns of New Hartford and Paris.

The work is under contract with the Board of Supervisors of Oneida County. The inclement season has prevented the making of good progress, so that at this time but 11,400 feet, commencing at the city line of Utica, has been graded, and the base laid for 5,000 feet. Trap rock for the top has been ordered and it is probable that the portion of the road now graded will be completed this season.

A quarry of local stone was opened by the county officers about one mile east of the road, near the highway known as Higby lane. The top rock is a coarse-grained sandstone structurally weak. The underlying rock, in a comparatively thin layer, is a strong and dense conglomerate. An attempt was made to use the sand top-rock for the base course and the screenings therefrom as a binder. The material, however, proved to be altogether too soft, and the screenings too granular to produce a good result, and the use was abandoned. The portion of the road so laid was treated as sub-grade and overlaid with limestone and trap. An experiment to determine the value of the conglomerate rock from the same quarry was made, screenings from crushed limestone being used for a binder, and gave satisfactory results.

The portion of the road to be completed this season has a base of limestone from Oriskany Falls, Munnsville and South Bethlehem. The top is trap rock from Rockland Lake, N. Y.,

and Morris County, N. J., the whole bound with limestone screenings.

The road is one of heavy traffic, and will be of great service to the city of Utica and the district it traverses.

MARCELLUS-MARIETTA No. 74, ONONDAGA COUNTY.

Length, 1 mile.

Width of macadam, 12 feet.

Engineer's estimate of total cost, \$9,200.

Percentage of work done to September 30, 1902, 0.

Contractor, Board of Supervisors, County of Onondaga.

John Dunfee & Company, Assignees.

Delay in the prosecution of other contracts by the contractor prevented the commencement of work upon this road this season.

FABIUS AND APULIA SECTION 2, ROAD No. 75, ONONDAGA COUNTY.

Length, .864 mile.

Width of macadam, 16 feet.

Engineer's estimate of total cost, \$8,800.

Percentage of work done to September 30, 1902, 21.

Contractors, John Dunfee & Company.

Part of the road leading from Apulia Station to the village of Fabius, the easterly section of three. A change in line was made to avoid a high hill. The contractors graded the road upon the new right of way and commenced to place the stone, but were obliged by rainy weather to desist, and finally to abandon the work for the season.

The bottom course is to consist of local quarry stone bound with sand and the top course of hard limestone furnished by the Onondaga County Penitentiary plant at Jamesville.

LA FAYETTE ROAD No. 76, ONONDAGA COUNTY.

Length, 1 mile.

Width of macadam, 16 feet.

Engineer's estimate of total cost, \$8,000.

Percentage complete to September 30, 1902, 52.

Contractor, John Dunfee & Company.

Part of the road from Syracuse to Tully, just north of the village of LaFayette.

Bottom course of crushed miscellaneous field stone bound with sand. Top course of selected hard limestone from fields and fences adjacent, and limestone from Jamesville, bound with limestone screenings. The work is progressing, and will be completed this season.

BLODGETTS MILLS ROAD No. 111, CORTLAND COUNTY.

Length, .75 mile.

Width of macadam, 12 feet.

Engineer's estimate of total cost, \$6,100.

Percentage of work done to September 30, 1902, 25.

Contractor, Town Board of the Town of Cortlandville.

This road leads from Cortland down the Tioughnioga River to Blodgetts Mills, and is just south of the city of Cortland.

The base consists of crushed stone from a local quarry, bound with screenings of the same, and the top of trap rock from Morris County, N. J., bound with limestone screenings.

The work has been greatly delayed by the wet season, and it is doubtful if it will be completed this season.

NORWICH-PLYMOUTH ROAD No. 112, CHENANGO COUNTY.

Length, 4.84 miles.

Width of macadam, 12 feet.

Engineer's estimate of total cost, \$39,900.

Percentage of work done to September 30, 1902, 49.

Contractors, Mott & Kemper.

This road leads from the north line of the village of Norwich northwesterly up the valley of Canasawacta Creek to Stewart's Corners, near the village of Plymouth.

Notwithstanding a particularly difficult contract and unfavorable weather, the contractors have worked faithfully and will finish about three miles of the contract.

The base course is of crushed native quarry stone bound with the screenings produced, and the top is of trap rock from Rockland Lake, bound with native stone screenings.

FABIUS AND APULIA ROAD No. 121, SECTION 3, ONONDAGA COUNTY.

Length, 1.16 miles.

Width of macadam, 16 feet.

Engineer's estimate of total cost, \$9,950.

Percentage of work done to September 30, 1902, 76.

Contractor, John Dunfee & Company.

Part of a road leading from Apulia Station towards Fabius, the westerly section of three.

The base and top course are both of hard limestone from Jamesville. The bottom course is bound with sand, and the top course with limestone screenings.

The road will be finished this season.

EAST LAKE SKANEATELES ROAD No. 122, ONONDAGA COUNTY.

Length, 1 mile.

Width of macadam, 16 feet.

Engineer's estimate of total cost, \$9,200.

Percentage of work done to September 30, 1902, 0.

Contractor, Board of Supervisors of Onondaga County.

A road leading south from the village of Skaneateles up the east side of Skaneateles Lake.

The work was not commenced this season.

PREBLE-HOMER ROAD No. 123, CORTLAND COUNTY.

Length, 1.23 miles.

Width of macadam, 12 feet.

Engineer's estimate of total cost, \$8,700.

Percentage of work done to September 30, 1902, 48.

Contractor, Town Board of the Town of Preble.

This is a road leading south from the village of Preble toward Homer.

It is built of native cobble field stone in both courses, all bound with the stone screenings produced. The stones for the top were selected.

The road will be finished this season.

LESTERSHIRE ROAD No. 125, BROOME COUNTY.

Length, 2.955 miles.

Width of macadam, 16 feet.

Engineer's estimate of total cost, \$28,500.

Percentage of work done to September 30, 1902, 47½.

Contractors, John Dunfee & Company.

The main road leading westerly down the north side of the Susquehanna River from the west line of the village of Lestershire, a suburb of Binghamton.

The base course is of crushed field stone with sand and stone screenings for binder; the top course of trap rock from Morris County, N. J., bound with limestone screenings.

It is probable that not more than 2¼ miles will be completed this season.

CONTRACTS COMPLETED AND SETTLED DURING THE FISCAL YEAR.

(See Table No. 5.)

CUYLER ROAD No. 40, CORTLAND COUNTY.

Length, 0.47 miles.

Width of macadam, 16 feet.

Engineer's estimate of cost, \$3,810.

Percentage of work done to September 30, 1902, 100.

Total cost, \$3,810.

Contractor, Town Board of the Town of Truxton.

A road through the village of Truxton in the town of Truxton. Top and bottom course of hard limestone from Perryville, Madison County. Binder throughout is of limestone screenings.

The road was commenced during the season of 1901, and completed and accepted in the summer of 1902.

CHENANGO RIVER ROAD No. 47, BROOME COUNTY.

Length, 1.75 miles.

Width of macadam, 16 feet.

Engineer's estimate of cost, \$16,200.

Percentage of work done to September 30, 1902, 100.

Total cost, \$17,100.

Contractors, Chambers & Casey.

This road is on the west side of the Chenango River, north from the north line of the city of Binghamton.

The bottom course consisted of crushed field stone, and the top of hard limestone bound with limestone screenings.

The work was commenced and nearly completed during the fall of 1901. It was completed and accepted early in the season of 1902.

RECAPITULATION OF WORK DONE TO SEPTEMBER 30, 1902.

| COUNTY. | Miles under contract during year ending September 30, 1902. | Miles of plans and estimates completed prior to September 30, 1901. | Miles of plans and estimates completed prior to September 30, 1902. | Miles of plans and estimates completed during year ending September 30, 1902. | Miles of surveys made during year ending September 30, 1902. | Miles of contracts completed prior to September 30, 1901. | Miles of contracts completed prior to September 30, 1902. | Miles of contracts completed during year ending September 30, 1902. |
|------------------------------------|---|---|---|---|--|---|---|---|
| Broome..... | 4.705 | 4.71 | 18.264 | 13.554 | 25.866 | .... | 1.75 | 1.75 |
| Cayuga..... | .... | 2.19 | 2.19 | .... | .... | .... | .... | .... |
| Chenango..... | 4.84 | 4.84 | 8.53 | 3.69 | 17.72 | .... | .... | .... |
| Cortland..... | 2.45 | 0.47 | 2.45 | 1.98 | 3.77 | .... | 0.47 | 0.47 |
| Jefferson..... | .... | .... | 3.92 | 3.92 | 40.855 | .... | .... | .... |
| Lewis..... | .... | .... | .... | .... | .... | .... | .... | .... |
| Madison..... | .... | .... | .... | .... | .... | .... | .... | .... |
| Oneida..... | 5.20 | 8.78 | 12.35 | 3.57 | 17.57 | 3.58 | 3.58 | .... |
| Onondaga..... | 8.024 | 13.04 | 15.33 | 2.29 | 2.29 | 1.78 | 1.78 | .... |
| Oswego..... | .... | 2.48 | 4.14 | 1.66 | 1.66 | .... | .... | .... |
| St. Lawrence..... | .... | 3.33 | 9.22 | 5.89 | .... | .... | .... | .... |
| Seneca..... | .... | .... | .... | .... | .... | .... | .... | .... |
| Tioga..... | .... | .... | .... | .... | .... | .... | .... | .... |
| Tompkins..... | .... | 1.87 | 3.25 | 1.38 | 1.38 | .... | .... | .... |
| Total miles and decimals of miles. | 25.219 | 41.71 | 79.644 | 37.934 | 111.111 | 5.36 | 7.58 | 2.22 |

IN CONCLUSION.

In presenting this my ninth annual report as Division Engineer, I take pleasure in thanking my superior officers for their uniform confidence and support, which has made the discharge of my duties a pleasure, while trying faithfully to serve the best interest of the State in my official capacity.

To Mr. Henry C. Allen, Resident Engineer, I give much praise for the faithful manner and unselfish interest he has displayed in the discharge of his duties, and I make special mention of his earnest efforts in the carrying forward of the work imposed upon this Department under Act, Chapter 115, Laws of 1898, and the preparation of the foregoing report and statistics in relation to improvement of roads under the Armstrong-Higbie Law.

To Mr. Guy Moulton, First Assistant Engineer, and to the several assistant engineers, we owe any success that may be accorded this Department in performance of work especially assigned them.

Since the construction of improved highways under the Armstrong-Higbie Law, has become a fixed policy of the State, and the appropriations therefor will without doubt be increased from year to year, it would seem desirable that engineers that show especial adaptability to properly perform the work incident to making surveys, estimates, and plans, as well as laying out and supervising the building of the roadway in a proper manner, should be sought, and the men secured retained throughout the year for that especial duty, as new men each year produce unsatisfactory results as well as increased cost of work under contract.

Respectfully submitted,

W. H. H. GERE,
Division Engineer.

TABLE No 1.

STATEMENT SHOWING THE NAMES, RANK AND COMPENSATION OF
ENGINEERS EMPLOYED ON THE MIDDLE DIVISION OF THE NEW
YORK STATE CANALS, TOGETHER WITH THE INCIDENTAL EX-
PENSES FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1902.

Ordinary Repairs — Erie Canal.

(Chapter 418, Laws 1900; chapter 644, Laws 1901.)

| NAME. | Rank. | Number of
days. | Rate of
compensation. | Salary. | Travel. | Total. |
|-------------------------------|------------------------------------|--------------------|--------------------------|------------|----------|------------|
| W. H. H. Gere..... | Division engineer..... | ..... | \$3,000 per yr. | \$1,238 90 | \$64 26 | \$1,303 16 |
| Henry C. Allen..... | Resident engineer..... | ..... | 2 400 per yr. | 765 52 | 99 06 | 864 58 |
| Frank B. Chapman... | Confidential clerk..... | 166 | 5 00 per day | 830 00 | ..... | 830 00 |
| L. D. Norton..... | Financial clerk..... | 107 | 5 00 per day | 535 00 | 8 19 | 543 19 |
| Guy Moulton..... | First assistant en-
gineer..... | 56 | 6 00 per day | 336 00 | 38 05 | 374 05 |
| Fred W. Sarr..... | Assistant engineer..... | 20 | 5 00 per day | 100 00 | 10 85 | 110 85 |
| H. C. Humphrey..... | Assistant engineer..... | 18 | 5 00 per day | 90 00 | ..... | 90 00 |
| Arthur O'Brien..... | Assistant engineer..... | 7 | 5 00 per day | 35 00 | ..... | 35 00 |
| Fred J. Wagner..... | Leveler..... | 19 | 4 50 per day | 85 50 | 7 03 | 92 53 |
| E. J. Berry..... | Leveler..... | 57 | 4 50 per day | 256 50 | 40 80 | 297 30 |
| Thad. L. Wilson..... | Leveler..... | 5 | 4 50 per day | 22 50 | 15 07 | 37 57 |
| L. K. Devendorf..... | Rodman..... | 27 | 3 50 per day | 94 50 | 13 33 | 107 83 |
| Geo. H. Thomas..... | Rodman..... | 51 | 3 50 per day | 178 50 | ..... | 178 50 |
| W. H. Porter..... | Rodman..... | 1 | 3 50 per day | 3 50 | ..... | 3 50 |
| John McCarty..... | Rodman..... | 15 | 3 50 per day | 52 50 | ..... | 52 50 |
| Howard U. Lyon..... | Chainman..... | 202 | 3 00 per day | 606 00 | ..... | 606 00 |
| Howard Crounse..... | Chainman..... | 248 | 3 00 per day | 744 00 | 10 75 | 754 75 |
| C. H. Mattison..... | Chainman..... | 93 | 3 00 per day | 279 00 | 4 38 | 283 38 |
| Henry E. Curtis..... | Chainman..... | 1 | 2 50 per day | 2 50 | ..... | 2 50 |
| Jeanne M. Crippen... | Tracer..... | 11 | 2 00 per day | 22 00 | ..... | 22 00 |
| L. L. Crosier..... | Laborer..... | ..... | ..... | ..... | 9 75 | 9 75 |
| <i>Incidental Expenses.</i> | | | | | | \$6,598 94 |
| Labor..... | ..... | ..... | ..... | ..... | \$185 50 | ..... |
| Livery..... | ..... | ..... | ..... | ..... | 70 10 | ..... |
| Stationery and printing ..... | ..... | ..... | ..... | ..... | 253 00 | ..... |
| Fuel and light..... | ..... | ..... | ..... | ..... | 198 13 | ..... |
| Postage..... | ..... | ..... | ..... | ..... | 61 70 | ..... |
| Telephone and telegraph ..... | ..... | ..... | ..... | ..... | 222 73 | ..... |
| Miscellaneous..... | ..... | ..... | ..... | ..... | 831 41 | ..... |
| Total..... | | | | | | \$8,421 51 |

Ordinary Repairs — Oswego Canal.

(Chapter 418, Laws 1900; chapter 644, Laws 1901.)

| NAME. | Rank. | Number of
days. | Rate of
compensation. | Salary. | Travel. | Total. |
|-------------------------------|------------------------|--------------------|--------------------------|----------|---------|----------|
| W. H. H. Gere..... | Division engineer..... | ..... | \$3 000 per yr. | \$596 30 | \$8 00 | \$604 30 |
| C. E. Hopkins..... | Leveler..... | 5 | 4 50 per day | 22 50 | 9 00 | 31 50 |
| Geo. H. Thomas..... | Rodman..... | 3 | 3 50 per day | 10 50 | ..... | 10 50 |
| <i>Incidental Expenses.</i> | | | | | | \$646 30 |
| Labor..... | ..... | ..... | ..... | ..... | \$4 75 | ..... |
| Livery..... | ..... | ..... | ..... | ..... | 6 00 | ..... |
| Telephone and telegraph ..... | ..... | ..... | ..... | ..... | 47 | ..... |
| Total..... | | | | | | \$657 52 |

Ordinary Repairs — Cayuga and Seneca Canal.

(Chapter 418, Laws 1900; chapter 644, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|------------------------|-----------------|-----------------------|----------|---------|----------|
| W. H. H. Gere..... | Division engineer..... | | \$3 000 per yr. | \$421 30 | \$8 30 | \$429 60 |
| <i>Incidental Expenses.</i> | | | | | | |
| Livery..... | | | | | | 4 00 |
| Total..... | | | | | | \$433 60 |

Ordinary Repairs — Black River Canal.

(Chapter 418, Laws 1900; chapter 644, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-------------------------------|-----------------|-----------------------|----------|---------|----------|
| W. H. H. Gere..... | Division engineer..... | | \$3 000 per yr. | \$425 00 | \$7 31 | \$432 31 |
| Guy Moulton..... | First assistant engineer..... | 2 | 6 00 per day | 12 00 | 4 35 | 16 35 |
| E. J. Berry..... | Leveler..... | 1 | 4 50 per day | 4 50 | 1 96 | 6 46 |
| <i>Incidental Expenses.</i> | | | | | | \$455 12 |
| Livery..... | | | | | | 6 00 |
| Total.. | | | | | | \$461 12 |

Extraordinary Repairs and Improvements — Repairing Oriskany Dam.

(Chapter 347, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|-------------------------------|-----------------|-----------------------|---------|---------|----------|
| Henry C. Allen..... | Resident engineer..... | | \$2 400 per yr. | \$69 23 | \$4 31 | \$73 54 |
| Guy Moulton..... | First assistant engineer..... | 1 | 6 00 per day | 6 00 | 9 47 | 15 47 |
| Fred J. Wagner..... | Leveler..... | 70 | 4 50 per day | 315 00 | 9 60 | 324 60 |
| L. K. Devendorf..... | Rodman..... | 4 | 3 50 per day | 14 00 | | 14 00 |
| Frank Lutz..... | Chainman..... | 23 | 2 50 per day | 57 50 | 1 00 | 58 50 |
| <i>Incidental Expenses.</i> | | | | | | \$486 11 |
| Livery..... | | | | | \$6 00 | |
| Postage..... | | | | | 58 | |
| Telephone and telegraph..... | | | | | 1 80 | |
| Miscellaneous..... | | | | | 3 34 | |
| Total..... | | | | | | 11 72 |
| | | | | | | \$497 83 |

**Extraordinary Repairs and Improvements — Repairing
Cowasselon Aqueduct.**

(Chapter 347, Laws 1901.)

| NAME. | Rank. | Number of
days. | Rate of
compensation. | Salary. | Travel. | Total. |
|-----------------------------|--------------|--------------------|--------------------------|---------|---------|---------|
| Fred J. Wagner..... | Leveler..... | 2 | \$4 50 per day | \$9 00 | \$4 08 | \$13 08 |
| Geo. H. Thomas..... | Rodman..... | 2 | 3 50 per day | 7 00 | ..... | 7 00 |
| <i>Incidental Expenses.</i> | | | | | | \$20 08 |
| Miscellaneous | | | | | | 30 |
| Total..... | | | | | | \$20 38 |

**Extraordinary Repairs and Improvements — Rebuilding Culvert,
Fayetteville Feeder.**

(Chapter 347, Laws 1901.)

| NAME. | Rank. | Number of
days. | Rate of
compensation. | Salary. | Travel. | Total. |
|-----------------------------|------------------------------------|--------------------|--------------------------|---------|---------|----------|
| Guy Moulton..... | First assistant en-
gineer..... | 7 | \$6 00 per day | \$42 00 | \$4 50 | \$46 50 |
| E. J. Berry..... | Leveler..... | 55 | 4 50 per day | 247 50 | 33 80 | 281 30 |
| L. K. Devendorf..... | Rodman..... | 2 | 3 50 per day | 7 00 | ..... | 7 00 |
| Geo. H. Thomas..... | Rodman..... | 2 | 3 50 per day | 7 00 | ..... | 7 00 |
| <i>Incidental Expenses.</i> | | | | | | \$341 80 |
| Labor..... | | | | | | 18 00 |
| Total..... | | | | | | \$359 80 |

**Extraordinary Repairs and Improvements — Fence Around
Geddes Basin.**

(Chapter 347, Laws 1901.)

| NAME. | Rank. | Number of
days. | Rate of
compensation. | Salary. | Travel. | Total. |
|---------------------|----------------------|--------------------|--------------------------|---------|---------|---------|
| Henry C. Allen..... | Resident engineer... | ..... | \$2,400 per yr. | \$14 81 | \$0 60 | \$15 41 |

*Extraordinary Repairs and Improvements — Rebuilding Bridge
Street Bridge, Geddes.*

(Chapter 347, Laws 1901.)

| NAME. | Rank. | Number of
days. | Rate of
compensation. | Salary. | Travel. | Total. |
|------------------|--------------|--------------------|--------------------------|---------|---------|---------|
| E. J. Berry..... | Leveler..... | 10 | \$4 50 per day | \$45 00 | \$2 00 | \$47 00 |

*Extraordinary Repairs and Improvements — Repairing
Richmond Aqueduct.*

(Chapter 347, Laws 1901.)

| NAME. | Rank. | Number of
days. | Rate of
compensation. | Salary. | Travel. | Total. |
|---------------------|--------------|--------------------|--------------------------|---------|---------|---------|
| Fred J. Wagner..... | Leveler..... | 17 | \$4 50 per day | \$76 50 | \$3 34 | \$79 84 |

*Extraordinary Repairs and Improvements — Rebuilding
Broadway Bridge, Fulton.*

(Chapter 347, Laws 1901.)

| NAME. | Rank. | Number of
days. | Rate of
compensation. | Salary. | Travel. | Total. |
|---------------------|---------------|--------------------|--------------------------|---------|---------|---------|
| Fred J. Wagner..... | Leveler | 4 | \$4 50 per day | \$18 00 | \$9 00 | \$27 00 |
| E. J. Berry..... | Leveler | 3 | 4 50 per day | 14 50 | 4 50 | 18 00 |
| Total..... | | | | | | \$45 00 |

*Extraordinary Repairs and Improvements — Rebuilding Abut-
ments Westernville Bridge, Black River Canal.*

(Chapter 347, Laws 1901.)

| NAME. | Rank. | Number of
days. | Rate of
compensation. | Salary. | Travel. | Total. |
|----------------------|---------------|--------------------|--------------------------|---------|---------|---------|
| Fred J. Wagner | Leveler | 2 | \$4 50 per day | \$9 00 | \$5 31 | \$14 31 |

Extraordinary Repairs and Improvements — Repairs to Adirondack Reservoirs and Roads. Inserting Pipes at South Lake.

(Chapter 347, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|--------------|-----------------|-----------------------|----------|---------|----------|
| Fred J. Wagner..... | Leveler..... | 38 | \$4 50 per day | \$171 00 | \$54 07 | \$225 07 |
| <i>Incidental Expenses.</i> | | | | | | |
| Livery..... | | | | | \$4 00 | |
| Miscellaneous..... | | | | | 45 | \$4 45 |
| Total..... | | | | | | \$229 52 |

Improving Harbor — Canandaigua Lake.

(Chapter 218, Laws 1900; chapter 594, Laws 1902; chapter 616, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|----------------------------|-------------------------------|-----------------|-----------------------|---------|---------|----------|
| Guy Moulton..... | First assistant engineer..... | 9 | \$6 00 per day | \$54 00 | \$53 17 | \$107 17 |
| H. C. Humphrey..... | Assistant engineer..... | 2 | 5 00 per day | 10 00 | | 10 00 |
| Harvey F. Hawley..... | Rodman..... | 2 | 3 50 per day | 7 00 | | 7 00 |
| Howard U. Lyon..... | Chainman..... | 3 | 3 00 per day | 9 00 | | 9 00 |
| Carl F. Hopstein..... | Chainman..... | 4 | 2 50 per day | 10 00 | | 10 00 |
| Henry E. Curtis..... | Chainman..... | 3 | 2 50 per day | 7 50 | | 7 50 |
| <i>Incidental Expenses</i> | | | | | | \$150 67 |
| Labor..... | | | | \$15 00 | | |
| Miscellaneous..... | | | | 3 50 | | 18 50 |
| Total..... | | | | | | \$169 17 |

For Continuing Construction of New Road on Indian Reservation.

(Chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-------------------------------|-----------------|-----------------------|---------|---------|---------|
| Guy Moulton..... | First assistant engineer..... | 4 | \$6 00 per day | \$24 00 | | \$24 00 |
| Fred J. Wagner..... | Leveler..... | 2 | 4 50 per day | 9 00 | | 9 00 |
| Geo. H. Thomas..... | Rodman..... | 1 | 3 50 per day | 3 50 | | 3 50 |
| Howard U. Lyon..... | Chainman..... | 2 | 3 00 per day | 6 00 | | 6 00 |
| <i>Incidental Expenses.</i> | | | | | | \$42 50 |
| Labor..... | | | | \$2 00 | | |
| Livery..... | | | | 4 00 | | 6 00 |
| Total..... | | | | | | \$48 50 |

REPORT OF STATE ENGINEER.

Brasher Falls Dam — St. Regis River.

(Chapter 645, Laws 1901).

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|---------------------|------------------------|-----------------|-----------------------|---------|---------|---------|
| Henry C. Allen..... | Resident engineer..... | 3 | \$2,400 per yr | \$37 04 | ..... | \$37 04 |
| W. H. Porter..... | Rodman..... | 3 | 3 50 per day | 10 50 | ..... | 10 50 |
| C. H. Mattison..... | Chainman..... | 1 | 3 00 per day | 3 00 | ..... | 3 00 |
| Total..... | | | | | | \$50 54 |

Dredging Inlet and Repairing Pier — Cayuga Lake.

(Chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-------------------------------|-----------------|-----------------------|---------|---------|---------|
| Guy Moulton..... | First assistant engineer..... | 2 | \$6 00 per day | \$12 00 | \$10 27 | \$22 27 |
| E. J. Berry..... | Leveler..... | 1 | 4 50 per day | 4 50 | ..... | 4 50 |
| <i>Incidental Expenses.</i> | | | | | | \$26 77 |
| Labor..... | | | | | | 2 00 |
| Total..... | | | | | | \$28 77 |

Dredging Inlet and Repairing Pier — Cayuga Lake.

(Chapter 413, Laws 1902.)

| NAMES. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-------------------------------|-----------------|-----------------------|---------|---------|----------|
| Henry C. Allen..... | Resident engineer..... | 7 | \$2,400 per yr. | \$7 41 | ..... | \$7 41 |
| Guy Moulton..... | First assistant engineer..... | 7 | 6 00 per day | 42 00 | \$17 47 | 59 47 |
| E. J. Berry..... | Leveler..... | 2 | 4 50 per day | 9 00 | ..... | 9 00 |
| Frederick Edwards... | Draftsman..... | 3 | 4 50 per day | 13 50 | 2 96 | 16 46 |
| <i>Incidental Expenses.</i> | | | | | | \$92 34 |
| Labor..... | | | | | \$10 00 | |
| Miscellaneous..... | | | | | 1 25 | |
| Total..... | | | | | | \$103 59 |

(Chapter 455, Laws 1900; chapter 681, Laws 1901.)

[illegible]

(Chapter 427, Laws 1898; chapter 417, Laws 1900.)

| NAME, | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|---------------------|-----------------|-----------------------|---------|---------|---------|
| Henry C. Allen..... | Resident engineer.. | .... | \$2,400 per yr. | \$7 69 | \$2 60 | \$10 29 |
| <i>Incidental Expenses.</i> | | | | | | |
| Postage..... | | | | | | 3 60 |
| Total..... | | | | | | \$13 98 |

(Chapter 397, Laws 1898; chapter 402, Laws 1900; chapter 537, Laws 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-------------------------|-----------------|-----------------------|---------|---------|----------|
| W. H. H. Gere..... | Division engineer..... | 1 | \$3. 00 per yr. | \$50 00 | ..... | \$50 00 |
| Henry C. Allen..... | Resident engineer..... | 1 | 2 40 per yr. | 38 46 | ..... | 38 46 |
| Frank B. Chapman.... | Confidential clerk..... | 2 | 5 00 per day | 10 00 | ..... | 10 00 |
| Fred. J. Wagner..... | Leveler..... | 3 | 4 50 per day | 27 00 | \$3 00 | 30 00 |
| John K. Lloyd..... | Draftsman..... | 2 | 4 50 per day | 9 00 | 2 12 | 11 12 |
| L. K. Devendorf..... | Rodman..... | 2 | 3 50 per day | 7 00 | ..... | 7 00 |
| Howard Crounse..... | Chainman..... | 6 | 3 00 per day | 18 00 | ..... | 18 00 |
| <i>Incidental Expenses.</i> | | | | | | \$164 88 |
| Postage..... | | | | | \$0 43 | |
| Miscellaneous..... | | | | | 80 79 | |
| Total..... | | | | | | \$245 80 |

Catherine Street Bridge, Syracuse.

(Chapter 424, Laws 1898; chapter 547, Laws 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-------------------------------|-----------------|-----------------------|---------|---------|----------|
| Henry C. Allen..... | Resident engineer.. | .... | \$2,400 per yr. | \$22 51 | ..... | \$22 51 |
| Guy Moulton..... | First assistant engineer..... | 5 | 6 00 per day | 30 00 | ..... | 30 00 |
| E. J. Berry..... | Leveler..... | 10 | 4 50 per day | 45 00 | ..... | 45 00 |
| Howard Crounse..... | Chainman..... | 6 | 3 00 per day | 18 00 | ..... | 18 00 |
| <i>Incidental Expenses.</i> | | | | | | \$115 51 |
| Labor..... | | | | | \$4 00 | |
| Postage..... | | | | | 2 96 | |
| Miscellaneous..... | | | | | 1 17 | |
| | | | | | | 8 13 |
| Total..... | | | | | | \$123 64 |

Foot Bridge at Brainard Street, Whitesboro.

(Chapter 428, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|---------------------|-----------------|-----------------------|---------|---------|---------|
| Henry C. Allen..... | Resident engineer.. | .... | \$2,400 per yr. | \$38 46 | \$0 85 | \$39 31 |
| Harvey F. Hawley.... | Rodman..... | 1 | 3 50 per day | 3 50 | ..... | 3 50 |
| <i>Incidental Expenses.</i> | | | | | | \$42 81 |
| Stationery and printing..... | | | | | \$6 42 | |
| Postage..... | | | | | 70 | |
| Miscellaneous..... | | | | | 9 07 | |
| | | | | | | 16 19 |
| Total..... | | | | | | \$59 00 |

Repairing Sea Walls — Owasco Lake.

(Chapter 419, Laws 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-----------------------|-----------------|-----------------------|---------|---------|----------|
| W. H. H. Gere..... | Division engineer.... | .... | \$3,000 per yr. | \$50 00 | ..... | \$50 00 |
| L. D. Norton..... | Financial clerk..... | 12 | 5 00 per day | 60 00 | ..... | 60 00 |
| E. J. Berry..... | Leveler..... | 22 | 4 50 per day | 99 00 | ..... | 99 00 |
| Howard U. Lyon..... | Chainman..... | 14 | 3 00 per day | 42 00 | ..... | 42 00 |
| Howard Crounse..... | Chainman..... | 15 | 3 00 per day | 45 00 | ..... | 45 00 |
| <i>Incidental Expenses.</i> | | | | | | \$296 00 |
| Postage..... | | | | | | 1 26 |
| Total... | | | | | | \$297 26 |

MIDDLE DIVISION: DAMS.

325

Filling in North Side Cut at Spring Street, Syracuse.

(Chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|----------------------|-----------------|-----------------------|---------|---------|---------|
| Henry C. Allen..... | Resident engineer... | .... | \$2,400 per yr. | \$53 85 | ..... | \$53 85 |
| <i>Incidental Expenses.</i> | | | | | | |
| Labor..... | | | | | | 4 00 |
| Total..... | | | | | | \$57 85 |

Steel Bulkheads at Braddock's Dam, Oswego River.

(Chapter 594, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|--------------|-----------------|-----------------------|---------|---------|---------|
| E. C. Clark..... | Leveler..... | 11 | \$4 50 per day | \$49 50 | \$15 12 | \$64 62 |
| <i>Incidental Expenses.</i> | | | | | | |
| Labor..... | | | | | \$4 00 | |
| Livery..... | | | | | 3 00 | |
| Stationery and printing..... | | | | | 25 | |
| Postage..... | | | | | 12 | |
| Miscellaneous..... | | | | | 1 05 | |
| | | | | | | 8 42 |
| Total..... | | | | | | \$73 04 |

Raising Minetto Dam, Oswego River.

(Chapter 594, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|----------------------|-------------|-----------------|-----------------------|---------|---------|--------|
| L. K. Devendorf..... | Rodman..... | 2 | \$3 50 per day | \$7 00 | ..... | \$7 00 |

**Guard Lock, Etc., Cayuga and Seneca Canal and Seneca River, for
Regulating the Waters of Seneca Lake.**

(Chapter 680, Laws 1900; chapter 616, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-----------------------|-----------------|-----------------------|----------|---------|------------|
| W. H. H. Gere..... | Division engineer... | ... | \$3,000 per yr. | \$50 00 | \$5 16 | \$55 16 |
| Henry C. Allen..... | Resident engineer... | ... | 2,400 per yr. | 124 21 | 17 13 | 141 34 |
| D. E. Whitford..... | Assistant engineer... | 240 | 5 00 per day | 1,200 00 | 89 84 | 1,289 84 |
| E. C. Clark..... | Leveler..... | 147 | 4 50 per day | 661 50 | 23 90 | 685 40 |
| Fred J. Wagner..... | Leveler..... | 1 | 4 50 per day | 4 50 | ..... | 4 50 |
| L. K. Devendorf..... | Rodman..... | 6 | 3 50 per day | 17 50 | 20 | 17 70 |
| Ernest D. Hendricks.. | Rodman..... | 85 | 3 50 per day | 308 00 | 16 43 | 324 43 |
| Howard U. Lyon..... | Chainman..... | 1 | 3 00 per day | 3 00 | ..... | 3 00 |
| <i>Incidental Expenses.</i> | | | | | | \$2,521 37 |
| Labor..... | | | | \$460 00 | | |
| Livery..... | | | | 11 00 | | |
| Stationery and printing. | | | | 5 21 | | |
| Office rent..... | | | | 63 00 | | |
| Postage..... | | | | 2 52 | | |
| Telephone and telegraph. | | | | 3 49 | | |
| Miscellaneous..... | | | | 21 57 | | |
| Total..... | | | | | | \$3,088 16 |

Extending Tow-path — Cayuga and Seneca Canal, Geneva.

(Chapter 662, Laws 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-------------------------------|-----------------|-----------------------|----------|---------|----------|
| W. H. H. Gere..... | Division engineer... | ... | \$3,000 per yr. | \$109 25 | \$2 86 | \$112 11 |
| Henry C. Allen..... | Resident engineer... | ... | 2,400 per yr. | 83 19 | ..... | 83 19 |
| Guy Moulton..... | First assistant engineer..... | 9 | 6 00 per day | 54 00 | 35 22 | 89 22 |
| D. E. Whitford..... | Assistant engineer... | 44 | 5 00 per day | 220 00 | 9 36 | 229 36 |
| H. C. Humphrey..... | Assistant engineer... | 5 | 5 00 per day | 25 00 | ..... | 25 00 |
| E. C. Clark..... | Leveler..... | 18 | 4 50 per day | 81 00 | ..... | 81 00 |
| L. K. Devendorf..... | Rodman..... | 3 | 3 50 per day | 10 50 | ..... | 10 50 |
| Harvey F. Hawley.... | Rodman..... | 1 | 3 50 per day | 3 50 | ..... | 3 50 |
| Howard U. Lyon..... | Chainman..... | 5 | 3 00 per day | 15 00 | ..... | 15 00 |
| Howard Crounse..... | Chainman..... | 6 | 3 00 per day | 18 00 | ..... | 18 00 |
| Henry E. Curtis..... | Chainman..... | 8 | 2 50 per day | 20 00 | ..... | 20 00 |
| <i>Incidental Expenses.</i> | | | | | | \$686 88 |
| Labor..... | | | | \$126 00 | | |
| Stationery and printing. | | | | 2 98 | | |
| Postage..... | | | | 1 66 | | |
| Office rent..... | | | | 21 00 | | |
| Telephone and telegraph. | | | | 50 | | |
| Miscellaneous..... | | | | 4 85 | | |
| Total..... | | | | | | \$843 87 |

Constructing Sewers through Tow-path at Geneva.

(Chapter 594, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|-------------------------------|-----------------|-----------------------|---------|---------|---------|
| Henry C. Allen | Resident engineer... | .... | \$2,400 per yr. | \$7 41 | ..... | \$7 41 |
| Guy Moulton..... | First assistant engineer..... | 4 | 6 00 per day | 24 00 | \$10 20 | 34 20 |
| Howard U. Lyon..... | Chainman..... | 2 | 3 00 per day | 6 00 | ..... | 6 00 |
| <i>Incidental Expenses.</i> | | | | | | \$47 61 |
| Labor..... | | | | | \$2 00 | |
| Miscellaneous..... | | | | | 40 | |
| Total..... | | | | | | \$50 01 |

Bridge at Seneca Falls — Cayuga and Seneca Canal.

(Chapter 396, Laws 1900; chapter 616, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|-------------------------------|-----------------|-----------------------|---------|---------|----------|
| Henry C. Allen..... | Resident engineer... | .... | \$2,400 per yr. | \$44 44 | ..... | \$44 44 |
| L. D. Norton..... | Financial clerk..... | 2 | 5 00 per day | 10 00 | ..... | 10 00 |
| Guy Moulton..... | First assistant engineer..... | 3 | 6 00 per day | 18 00 | ..... | 18 00 |
| D. E. Whitford..... | Assistant engineer..... | 10 | 5 00 per day | 50 00 | \$9 70 | 59 70 |
| E. C. Clark..... | Leveler..... | 6 | 4 50 per day | 27 00 | 8 90 | 35 90 |
| Howard U. Lyon..... | Chainman..... | 6 | 3 00 per day | 18 00 | ..... | 18 00 |
| Howard Crounse..... | Chainman..... | 6 | 3 00 per day | 15 00 | ..... | 15 00 |
| <i>Incidental Expenses.</i> | | | | | | \$201 04 |
| Labor..... | | | | | \$6 00 | |
| Postage..... | | | | | 1 34 | |
| Telephone and telegraph..... | | | | | 30 | |
| Miscellaneous..... | | | | | 69 08 | |
| Total..... | | | | | | \$277 76 |

REPORT OF STATE ENGINEER.

Castorland Dyke, Black River.

(Chapter 474, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|-------------------------------|-----------------|-----------------------|---------|---------|---------|
| Henry C. Allen..... | Resident engineer... | .... | \$2,400 per yr. | \$7 41 | ..... | \$7 41 |
| Guy Moulton..... | First assistant engineer..... | 2 | 6 00 per day | 12 00 | \$3 53 | 15 53 |
| E. J. Berry..... | Leveler..... | 10 | 4 50 per day | 45 00 | 12 00 | 57 00 |
| <i>Incidental Expenses.</i> | | | | | | \$79 94 |
| Livery..... | | | | | \$12 00 | |
| Telephone and telegraph..... | | | | | 25 | 12 25 |
| Total..... | | | | | | \$92 19 |

Forestport Dam, Black River.

(Chapter 420, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|----------------------|-----------------|-----------------------|---------|---------|----------|
| W. H. H. Gere..... | Division engineer... | .... | \$3,000 per yr. | \$50 00 | \$4 66 | \$54 66 |
| Henry C. Allen..... | Resident engineer... | .... | 2,400 per yr. | 68 67 | 14 73 | 83 40 |
| A. B. Samuelson..... | Assistant engineer.. | 5 | 5 00 per day | 25 00 | ..... | 25 00 |
| Fred J. Wagner..... | Leveler..... | 53 | 4 50 per day | 238 50 | 16 31 | 254 81 |
| E. J. Berry..... | Leveler..... | 22 | 4 50 per day | 99 00 | 5 76 | 104 76 |
| L. K. Devendorf..... | Rodman..... | 7 | 3 50 per day | 24 50 | ..... | 24 50 |
| Howard U. Lyon..... | Chainman..... | 7 | 3 00 per day | 21 00 | 11 40 | 32 40 |
| C. H. Mattison..... | Chainman..... | 48 | 3 00 per day | 144 00 | 1 37 | 145 37 |
| <i>Incidental Expenses.</i> | | | | | | \$724 90 |
| Livery..... | | | | | \$4 50 | |
| Postage..... | | | | | 58 | |
| Miscellaneous..... | | | | | 4 00 | 9 08 |
| Total..... | | | | | | \$733 98 |

Bridge at Pratt's Landing, Black River.

(Chapter 670, Laws 1900; chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|------------------------|-----------------|-----------------------|---------|---------|----------|
| Henry C. Allen..... | Resident engineer..... | 94 | \$2,400 per yr. | \$16 00 | \$5 06 | \$21 06 |
| E. J. Berry..... | Leveler..... | 1 | 4 50 per day | 423 00 | 60 17 | 483 17 |
| L. K. Devendorf..... | Rodman..... | 1 | 3 50 per day | 3 50 | ..... | 3 50 |
| C. H. Mattison..... | Chainman..... | 8 | 3 00 per day | 24 00 | 6 64 | 30 64 |
| <i>Incidental Expenses.</i> | | | | | | \$538 37 |
| Labor..... | | | | | \$28 00 | |
| Livery..... | | | | | 30 00 | |
| Postage..... | | | | | 90 | |
| Telegraph and telephone..... | | | | | 1 85 | |
| Miscellaneous..... | | | | | 44 97 | |
| Total..... | | | | | | 105 72 |
| | | | | | | \$644 09 |

Surveys for State Court of Claims.

(Chapter 419, Laws 1900; chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|-------------------------------|-----------------|-----------------------|----------|----------|------------|
| Guy Moulton..... | First assistant engineer..... | 96 | \$6 00 per day | \$576 00 | \$293 86 | \$869 86 |
| H. C. Humphrey..... | Assistant engineer..... | 9 | 5 00 per day | 45 00 | ..... | 45 00 |
| Fred J. Wagner..... | Leveler..... | 15 | 4 50 per day | 67 50 | ..... | 67 50 |
| E. J. Berry..... | Leveler..... | 7 | 4 50 per day | 31 50 | 7 06 | 38 56 |
| Paul McLoud..... | Draftsman..... | 24 | 4 50 per day | 108 00 | ..... | 108 00 |
| John A. Brous..... | Draftsman..... | 8 | 4 50 per day | 36 00 | 3 37 | 39 37 |
| L. K. Devendorf..... | Rodman..... | 21 | 3 50 per day | 73 50 | ..... | 73 50 |
| Geo. H. Thomas..... | Rodman..... | 11 | 3 50 per day | 38 50 | ..... | 38 50 |
| Frank Roberts..... | Rodman..... | 7 | 3 50 per day | 24 50 | 60 | 25 10 |
| Harvey F. Hawley..... | Rodman..... | 17 | 3 50 per day | 59 50 | ..... | 59 50 |
| John McCarty..... | Rodman..... | 26 | 3 50 per day | 91 00 | ..... | 91 00 |
| Howard U. Lyon..... | Chainman..... | 3 | 3 00 per day | 9 00 | ..... | 9 00 |
| Howard Crounse..... | Chainman..... | 25 | 3 00 per day | 75 00 | ..... | 75 00 |
| Carl F. Hopstein..... | Chainman..... | 48 | 2 50 per day | 120 00 | ..... | 120 00 |
| Henry E. Curtis..... | Chainman..... | 48 | 2 50 per day | 120 00 | ..... | 120 00 |
| C. H. Mattison..... | Chainman..... | 6 | 3 00 per day | 18 00 | 4 38 | 22 38 |
| L. D. Norton..... | Financial clerk..... | 22 | 5 00 per day | 110 00 | ..... | 110 00 |
| <i>Incidental Expenses.</i> | | | | | | \$1,912 27 |
| Labor..... | | | | | \$157 00 | |
| Livery..... | | | | | 158 00 | |
| Stationery and printing..... | | | | | 9 50 | |
| Postage..... | | | | | 89 | |
| Telegraph and telephone..... | | | | | 90 | |
| Miscellaneous..... | | | | | 35 80 | |
| Total..... | | | | | | 362 09 |
| | | | | | | \$2,274 36 |

Improvement Public Highways.

(Chapter 419, Laws 1900; chapter 642, Laws 1901; chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|--------------------------|-------------------------|-----------------|-----------------------|---------|---------|----------|
| W. H. H. Gere..... | Division engineer... | ..... | \$3,000 per yr. | \$9 25 | \$3 55 | \$12 80 |
| Henry C. Allen..... | Resident engineer... | ..... | 2,400 per yr. | 995 30 | 230 74 | 1,226 04 |
| Guy Moulton..... | First ass't engineer... | 107 | 6 00 per day | 642 00 | 465 60 | 1,107 60 |
| Fred W. Sarr..... | Assistant engineer... | 187 | 5 00 per day | 935 00 | 277 31 | 1,212 31 |
| H. C. Humphrey..... | Assistant engineer... | 103 | 5 00 per day | 515 00 | 17 68 | 532 68 |
| Arthur O'Brien..... | Assistant engineer... | 19 | 5 00 per day | 95 00 | 167 42 | 262 42 |
| W. W. Stone..... | Assistant engineer... | 71 | 5 00 per day | 355 00 | 64 82 | 419 82 |
| M. B. Palmer..... | Assistant engineer... | 85 | 5 00 per day | 425 00 | 13 00 | 438 00 |
| John D. Colby..... | Assistant engineer... | 16 | 5 00 per day | 80 00 | 12 46 | 92 46 |
| A. B. Samuelson..... | Assistant engineer... | 56 | 5 00 per day | 280 00 | 430 33 | 710 33 |
| Fred J. Wagner..... | Leveler..... | 84 | 4 50 per day | 378 00 | 171 28 | 549 28 |
| E. J. Berry..... | Leveler..... | 47 | 4 50 per day | 211 50 | 6 45 | 217 95 |
| E. C. Clark..... | Leveler..... | 108 | 4 50 per day | 486 00 | 11 74 | 497 74 |
| C. E. Hopkins..... | Leveler..... | 81 | 4 50 per day | 364 50 | 1 10 | 365 60 |
| Edwin Styring..... | Leveler..... | 67 | 4 50 per day | 301 50 | 25 89 | 327 39 |
| Thad. L. Wilson..... | Leveler..... | 100 | 4 50 per day | 450 00 | 22 87 | 472 87 |
| Paul McCloud..... | Draftsman..... | 39 | 4 50 per day | 175 50 | 43 33 | 218 83 |
| John K. Lloyd..... | Draftsman..... | 46 | 4 50 per day | 207 00 | 5 36 | 212 36 |
| John A. Brous..... | Draftsman..... | 6 | 4 50 per day | 27 00 | ..... | 27 00 |
| L. K. Devendorf..... | Rodman..... | 133 | 3 50 per day | 465 50 | 3 50 | 469 00 |
| Geo. H. Thomas..... | Rodman..... | 245 | 3 50 per day | 857 50 | 9 43 | 866 93 |
| Thad. L. Wilson..... | Rodman..... | 62 | 3 50 per day | 217 00 | 28 10 | 245 10 |
| Frank Roberts..... | Rodman..... | 161 | 3 50 per day | 563 50 | 12 46 | 575 96 |
| W. H. Porter..... | Rodman..... | 21 | 3 50 per day | 73 50 | ..... | 73 50 |
| Harvey F. Hawley..... | Rodman..... | 83 | 3 50 per day | 290 50 | 2 96 | 293 46 |
| Nathan E. Young..... | Rodman..... | 89 | 3 50 per day | 311 50 | 15 80 | 327 30 |
| Geo. H. Hand..... | Rodman..... | 45 | 3 50 per day | 157 50 | 1 78 | 159 28 |
| Howard A. Cleaver..... | Rodman..... | 44 | 3 50 per day | 154 00 | 24 | 154 24 |
| S. E. Vandenberg..... | Rodman..... | 32 | 3 50 per day | 112 00 | ..... | 112 00 |
| J. W. Fancher..... | Rodman..... | 28 | 3 50 per day | 95 00 | 8 66 | 106 66 |
| A. G. Bohannon..... | Rodman..... | 29 | 3 50 per day | 101 50 | 2 05 | 103 55 |
| Howard U. Lyon..... | Chainman..... | 71 | 3 00 per day | 213 00 | ..... | 213 00 |
| C. H. Mattison..... | Chainman..... | 160 | 3 00 per day | 480 00 | 2 00 | 482 00 |
| Frank Lutz..... | Chainman..... | 144 | 2 50 per day | 360 00 | 1 38 | 361 38 |
| A. W. Gillis..... | Chainman..... | 83 | 2 50 per day | 207 50 | 5 82 | 213 32 |
| Fred H. Owens..... | Chainman..... | 78 | 2 50 per day | 195 00 | 18 76 | 213 76 |
| L. Kavanagh..... | Chainman..... | 168 | 2 50 per day | 420 00 | 13 20 | 433 20 |
| F. G. Tilton..... | Chainman..... | 29 | 2 50 per day | 72 50 | ..... | 72 50 |
| Henry E. Curtis..... | Chainman..... | 3 | 2 50 per day | 7 50 | 1 71 | 9 21 |
| W. J. Wilds..... | Laborer..... | ..... | ..... | ..... | 1 88 | 1 88 |
| L. L. Crozier..... | Laborer..... | ..... | ..... | ..... | 7 74 | 7 74 |
| W. W. Thurston..... | Laborer..... | ..... | ..... | ..... | 4 50 | 4 50 |
| Cheslar C. Pillmore..... | Laborer..... | ..... | ..... | ..... | 3 03 | 3 03 |
| Harry G. Lennox..... | Laborer..... | ..... | ..... | ..... | 2 59 | 2 59 |

Incidental Expenses.

| | | |
|------------------------------|------------|-------------|
| Labor..... | \$1,990 25 | |
| Livery..... | 508 60 | |
| Stationery and printing..... | 181 95 | |
| Postage..... | 7 98 | |
| Telephone and telegraph..... | 34 46 | |
| Miscellaneous..... | 310 48 | |
| | | 3,033 72 |
| Totals..... | | \$17,442 29 |

Improvement Public Highways — Completed Roads Inspection.

(Chapter 115, Laws 1898, and chapter 293, Laws 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|---------------------|----------------------|-----------------|-----------------------|---------|---------|--------|
| Henry C. Allen..... | Resident engineer... | ..... | \$2,400 per yr. | \$7 69 | \$0 20 | \$7 89 |

Summary.

| ITEMS. | AUTHORIZED BY | | Amounts. | Totals. | | | |
|--|---------------|-------|------------|------------|----------|--------|--|
| | Chap. | Laws. | | | | | |
| ORDINARY REPAIRS. | | | | | | | |
| Erie Canal..... | 418 | 1900 | \$8,421 51 | \$9,973 75 | | | |
| | 644 | 1901 | | | | | |
| Oswego Canal | 418 | 1900 | 657 52 | | | | |
| | 644 | 1901 | | | | | |
| Cayuga and Seneca Canal..... | 418 | 1900 | 433 60 | | | | |
| | 644 | 1901 | | | | | |
| Black River Canal..... | 418 | 1900 | 461 12 | | | | |
| | 644 | 1901 | | | | | |
| EXTRAORDINARY REPAIRS AND IMPROVEMENTS. | | | | | | | |
| <i>Erie Canal.</i> | | | | | | | |
| Repairing Oriskany Dam..... | 347 | 1901 | \$497 83 | | 1,309 09 | | |
| Repairing Cowasselon Aqueduct..... | 347 | 1901 | 20 38 | | | | |
| Rebuilding culvert, Fayetteville Feeder | 347 | 1901 | 359 80 | | | | |
| Fence around Geddes Basin..... | 347 | 1901 | 15 41 | | | | |
| Rebuilding Bridge street bridge, Geddes..... | 347 | 1901 | 47 00 | | | | |
| Repairing Richmond Aqueduct..... | 347 | 1901 | 79 84 | | | | |
| <i>Oswego Canal.</i> | | | | | | | |
| Rebuilding Broadway Bridge, Fulton..... | 347 | 1901 | 45 00 | | | | |
| <i>Black River Canal.</i> | | | | | | | |
| Rebuilding abutments, Westernville bridge..... | 347 | 1901 | 14 31 | | | | |
| Inserting pipes at South Lake..... | 347 | 1901 | 229 52 | | | | |
| SPECIAL APPROPRIATIONS. | | | | | | | |
| Improving harbor, Canandaigua Lake..... | 218 | 1900 | \$169 17 | | | | |
| | 594 | 1902 | | | | | |
| | 616 | 1902 | | | | | |
| Continuing new road, Indian Reservation..... | 645 | 1901 | 48 50 | | | | |
| Brasher Falls Dam, St. Regis River..... | 645 | 1901 | 50 54 | | | | |
| Dredging inlet and repairing pier, Cayuga Lake... | 641 | 1901 | 28 77 | | | | |
| Dredging inlet and repairing pier, Cayuga Lake... | 413 | 1902 | 103 59 | | | | |
| Repairing and rebuilding retaining walls, Liberty street bridge, Penn Yan..... | 455 | 1900 | 375 17 | | | | |
| | 681 | 1901 | | | | | |
| <i>Erie Canal.</i> | | | | | | | |
| Schuyler street bridge, Utica..... | 417 | 1898 | 13 98 | | | | |
| | 427 | 1900 | | | | | |
| | 397 | 1898 | | | | | |
| Washington street bridge, Utica..... | 402 | 1900 | 245 80 | | | | |
| | 537 | 1900 | | | | | |
| | 424 | 1898 | | | | | |
| Catherine street bridge, Syracuse..... | 547 | 1900 | 123 64 | | | | |
| Foot bridge at Brainard street, Whitesboro..... | 428 | 1901 | 59 00 | | | | |
| Repairing sea walls, Oswego Lake..... | 419 | 1900 | 297 26 | | | | |
| <i>Oswego Canal.</i> | | | | | | | |
| Filling in north side cut, Spring street, Syracuse .. | 645 | 1901 | 57 85 | | | | |
| Steel bulkheads at Braddock Dam, Oswego River..... | 594 | 1902 | 73 04 | | | | |
| Raising Minetto Dam, Oswego River..... | 594 | 1902 | 7 00 | | | | |
| <i>Cayuga and Seneca Canal.</i> | | | | | | | |
| Guard lock, etc., regulating Seneca Lake..... | 680 | 1900 | 3,088 16 | | | | |
| | 616 | 1902 | | | | | |
| | 662 | 1900 | | | | | |
| Extending towpath at Geneva..... | | | 843 87 | | | | |
| Constructing sewers through towing path, Geneva..... | 594 | 1902 | | | | 50 01 | |
| | 396 | 1900 | | | | 277 76 | |
| Bridge at Seneca Falls..... | 616 | 1902 | | | | | |
| <i>Black River Canal.</i> | | | | | | | |
| Castorland Dyke, Black River..... | 474 | 1902 | 92 19 | | | | |
| Forestport Dam, Black River..... | 420 | 1902 | 733 98 | | | | |
| Bridge at Pratt's Landing, Black River..... | 670 | 1900 | 644 09 | | | | |
| | 645 | 1901 | | | | | |
| | | | | 7,383 37 | | | |

Summary — (Continued).

| ITEMS. | AUTHORIZED BY | | Amounts. | Totals. |
|---|---------------|--------|-------------|-------------|
| | Chap. | Laws. | | |
| SPECIAL SURVEYS. | | | | |
| Surveys for State Court of Claims..... | { 419 | 1900 { | ..... | \$2,274 36 |
| | 645 | 1901 { | | |
| Highway improvements..... | { 419 | 1900 { | \$17,442 29 | |
| | 642 | 1901 { | | |
| | 645 | 1901 { | | |
| Highway improvements, inspection account.... | { 115 | 1898 { | 7 89 | |
| | 293 | 1900 { | | |
| | | | | 17,450 18 |
| Total abstracts rendered during fiscal year.. | ..... | ..... | ..... | \$38,890 75 |

TABLE No. 2.
STATEMENT OF CONTRACTS IN FORCE SEPTEMBER 30, 1902.

| NAME OF CONTRACTOR. | Date of contract. | Character of work. | ACT. | | Engineer's estimate. | Engineer's estimate at contract prices. | Payments to September 30, 1902. |
|--|-------------------|---|-------|--------|----------------------|---|---------------------------------|
| | | | Chap. | Laws. | | | |
| John R. Y. Craigie and Stephen Maggio. | Sept. 12, 1900 | Guard lock, etc., Seneca Lake outlet | { 680 | 1900 { | \$76,440 00 | \$86,573 00 | \$52,258 00 |
| William H. Welch..... | Oct. 4, 1900 | Excavating and deepening the harbor and channel and the entrance at the foot of Canandaigua Lake..... | { 616 | 1902 { | | | |
| | | | { 218 | 1900 { | 7,875 00 | 7,831 25 | 5,304 00 |
| | | | { 616 | 1902 { | | | |
| | | | { 670 | 1900 { | | | |
| | | | { 645 | 1901 { | 14,500 00 | 16,790 00 | 12,546 00 |
| | | | { 594 | 1902 { | | | |
| American Bridge Company | Aug. 8, 1901 | Pratt's Landing bridge, Black River | | 1902 | 6,600 00 | 6,199 50 | 4,320 00 |
| Battle Island Paper Co..... | June 3, 1902 | Constructing a steel bulkhead at Battle Island dam, Oswego River..... | 594 | 1901 | | | |
| Walter Bradley & Co..... | June 3, 1902 | Raising and completing High dam, Oswego River..... | { 645 | 1902 { | 4,677 00 | 4,277 75 | Nothing |
| | | | { 594 | 1901 { | | | |
| Walter Bradley & Co..... | June 3, 1902 | Raising and completing Minetto dam, Oswego River..... | { 645 | 1901 { | 5,060 00 | 4,530 00 | Nothing |
| | | | { 594 | 1902 { | | | |
| J. T. Campbell | Aug. 21, 1902 | Raising Carthage bridge, Black River | 594 | 1902 | 1,256 69 | 999 00 | Nothing |
| Walter Bradley & Co..... | June 3, 1902 | Forestport dam, Black River..... | 420 | 1902 | 39,632 50 | 37,096 75 | 8,154 00 |
| B. P. Clark..... | Jan. 28, 1902 | Brasher Falls dam, St. Regis River..... | 645 | 1901 | 3,066 00 | 3,229 50 | Nothing |
| Owego Bridge Company..... | Sept. 30, 1902 | South James street bridge at Rome..... | 614 | 1902. | 14,665 50 | 17,445 00 | Nothing |

TABLE NO. 3.
STATEMENT OF CONTRACTS COMPLETED AND SETTLED DURING THE FISCAL YEAR.

| NAME OF CONTRACTOR. | Date of contract. | Character of work. | Act. | | Appropriation. | Engineer's estimate. | Final account. |
|--------------------------|-------------------|--|----------------|------------------|----------------|----------------------|----------------|
| | | | Chap. | Laws. | | | |
| American Bridge Co. | Aug. 28, 1900 | Bridge over Seneca River near Rumsey st., Seneca Falls..... | { 224
396 } | { 1899
1900 } | \$8,000 00 | \$12,765 00 | \$6,148 83 |
| A. F. Chapman & Co. | Oct. 6, 1900 | Constructing and extending the tow-path at Geneva..... | 662 | 1900 | 45,000 00 | 38,125 00 | 31,335 16 |
| Marson & Ryan..... | Oct. 9, 1901 | Repairing and rebuilding retaining walls, etc., Liberty street bridge, Penn Yan..... | 681 | 1901 | 2,400 00 | 2,326 00 | 2,114 13 |
| Havana Bridge Works..... | April 21, 1899 | Lift bridge at Schuyler street, Utica..... | { 427
417 } | { 1898
1900 } | 18,000 00 | 10,000 00 | 10,517 79 |
| Havana Bridge Works..... | Oct. 19, 1900 | Lift bridge at Washington street, Utica..... | { 397
492 } | { 1898
1900 } | 27,000 00 | 22,864 00 | 23,107 42 |
| Havana Bridge Works..... | Oct. 11, 1900 | Lift bridge at Catherine and Almond streets, Syracuse..... | { 424
547 } | { 1898
1900 } | 23,000 00 | 13,530 70 | 20,654 42 |
| American Bridge Co..... | Oct. 23, 1901 | Bridge at Brainard street, Whitesboro..... | { 625
428 } | { 1899
1901 } | 2,000 00 | 1,456 25 | 1,538 66 |

TABLE No. 4.
STATEMENT OF CONTRACTS FOR THE IMPROVEMENT OF PUBLIC HIGHWAYS IN FORCE SEPTEMBER 30, 1902.
(Chapter 115, Laws of 1898.)

| CONTRACTOR. | Date of contract. | Name of road. | * Engineer's preliminary estimate. | Contract price. | Payments to September 30, 1902. |
|-----------------------------------|-------------------|--|------------------------------------|-----------------|---------------------------------|
| Charley & Cuddeback..... | Nov. 29, 1901 | Skaneateles West Lake, No. 48..... | \$9,100 00 | \$8,298 00 | \$5,165 51 |
| John Dunfee & Company..... | May 17, 1902 | Fabius and Apulia, section 1, No. 49..... | 17,900 00 | 16,000 00 | 1,800 00 |
| Supervisors, Oneida County..... | May 6, 1902 | Utica and Paris, No. 71..... | 47,200 00 | 42,438 70 | 6,365 50 |
| Supervisors, Onondaga County..... | June 18, 1902 | Marcellus and Marietta, No. 74..... | 9,200 00 | 8,500 00 | Nothing |
| John Dunfee & Company..... | May 17, 1902 | Fabius and Apulia, section 2, No. 75..... | 8,800 00 | 7,800 00 | 1,228 50 |
| John Dunfee & Company..... | May 17, 1902 | Lafayette, No. 76..... | 8,000 00 | 7,800 00 | 3,042 00 |
| Town of Cortlandville..... | May 23, 1902 | Blodgett's Mills, No. 111..... | 6,100 00 | 5,512 05 | 1,033 51 |
| Mott & Kemper..... | May 20, 1902 | Norwich and Plymouth, No. 112..... | 39,900 00 | 35,840 00 | 13,171 20 |
| John Dunfee & Company..... | May 17, 1902 | Fabius and Apulia, section 3, No. 121..... | 9,950 00 | 9,300 00 | 5,301 00 |
| Supervisors, Onondaga County..... | June 18, 1902 | Skaneateles East Lake, No. 122..... | 9,200 00 | 8,300 00 | Nothing |
| Town of Preble..... | May 28, 1902 | Preble and Homer, No. 123..... | 8,700 00 | 7,071 57 | 2,545 76 |
| John Dunfee & Company..... | July 2, 1902 | Lestershire, No. 125..... | 28,500 00 | 26,000 00 | 9,262 50 |

* Includes engineering and inspection.

TABLE No. 5.
STATEMENT OF CONTRACTS FOR THE IMPROVEMENT OF PUBLIC HIGHWAYS COMPLETED AND SETTLED
DURING THE FISCAL YEAR ENDING SEPTEMBER 30, 1902.

(Chapter 115, Laws of 1898.)

| CONTRACTOR. | Date of contract. | Name of road. | * Engineer's preliminary estimate. | Contract price. | Final account. |
|------------------------|-------------------|---------------------------------|------------------------------------|-----------------|----------------|
| Chambers & Casey | Aug. 12, 1901 | Chenango River road No. 47..... | \$16,200 00 | \$15,980 00 | \$15,980 00 |
| Town of Truxton | July 16, 1901 | Cuyler road, No. 40..... | 3,810 00 | 3,420 00 | 3,420 00 |

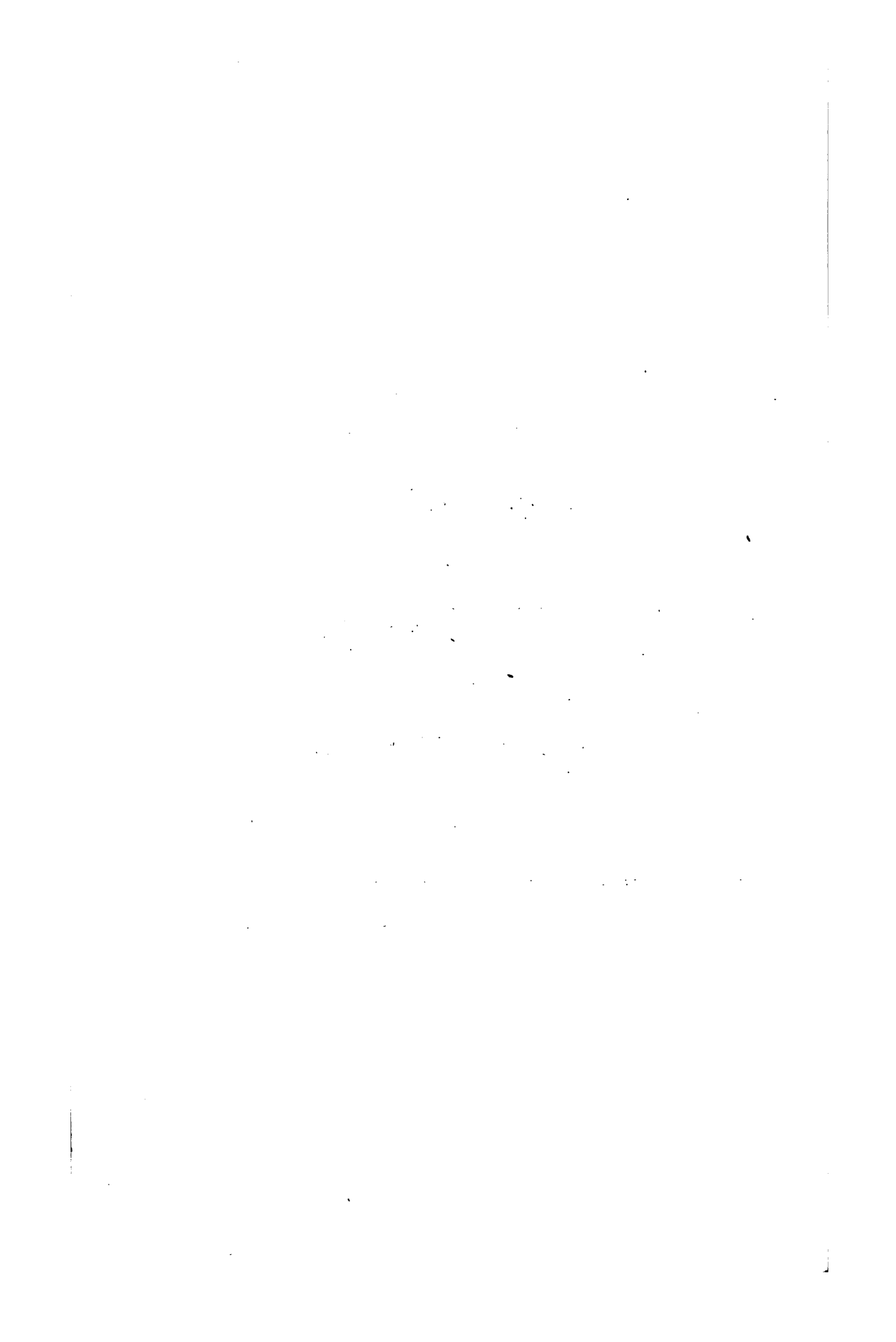
* Includes engineering and inspection.

TABLE No. 6.
WATER RECORDS OF CAYUGA AND CROSS LAKES AND SENECA RIVER, CONTINUED.
(See State Engineer's Report for 1901 for previous records.)

| LOCATION. | 1901,
DECEMBER 9 AND 10,
WATER. | | 1902,
MARCH 5 AND 6,
WATER. | | 1902,
AUGUST 8 AND 9,
WATER. | | Remarks. |
|--|---------------------------------------|--------|-----------------------------------|--------|------------------------------------|--------|------------------------------------|
| | Surface. | Depth. | Surface. | Depth. | Surface. | Depth. | |
| Cayuga Lake..... | — 8.988 | 10.10 | — 5.798 | 13.28 | — 5.798 | 13.30 | Depth on lower mitre sill of lock. |
| Mud Lock..... | — 9.114 | 10.10 | — 5.874 | 13.35 | — 5.934 | 13.15 | Depth on lower mitre sill of lock. |
| Canandaigua River, south of canal..... | — 10.780 | 6.30 | — 7.050 | 11.00 | — 8.414 | 8.60 | Depth of river. |
| Seneca River Aqueduct..... | — 10.991 | 7.40 | — 6.221 | 12.10 | — 8.791 | 6.50 | Depth on aqueduct foundation. |
| Canandaigua River, north of canal..... | — 11.066 | 6.60 | — 6.266 | 11.37 | — 8.742 | 8.90 | Depth of river. |
| West Shore Railroad Crossing..... | — 11.229 | 4.40 | — 6.969 | 8.70 | — 9.385 | 8.90 | Depth in channel. |
| N. Y. C. & H. R. R. Crossing..... | — 11.756 | 3.80 | — 7.256 | 10.00 | — 9.778 | 7.50 | Depth on bridge foundation. |
| Mosquito Point..... | — 13.876 | 2.28 | — 7.900 | 8.10 | — 11.525 | 9.50 | Depth in channel. |
| Cross Lake..... | — 14.959 | 21.50 | — 9.589 | 29.90 | — 13.273 | 22.50 | Depth at iron bridge. |

REPORT
OF THE
DIVISION ENGINEER
OF THE
WESTERN DIVISION

For the Fiscal Year Ending September 30, 1902.



WESTERN DIVISION.

ROCHESTER, *October 1, 1902.*

HON. EDWARD A. BOND, *State Engineer and Surveyor, Albany,
N. Y.:*

DEAR SIR.—I have the honor of submitting the following report of the work performed by and under my direction as Division Engineer of the Western Division, during the fiscal year ending September 30, 1902, consisting of canal and special appropriation work, and highway improvements, under chapter 115, Laws of 1898:

CANALS AND SPECIAL APPROPRIATIONS.

No changes have been made during the past year, in the extent of the canals and feeders upon this division, which consist of 152.01 miles of navigable canals and slips, and 32.45 miles of unnavigable slips and feeders, as shown in detail in my report of 1900.

Navigation upon this division has been accomplished during the past season without serious interruption, no breaks of a grave nature having occurred.

The abutment of Seymour Street Bridge, No. 179, Tonawanda, failed during the year, precipitating the superstructure into the canal.

A new timber superstructure has recently been erected at Drake's Bridge, No. 60.

Last spring the north bulkhead wall of the waste gates of the Tonawanda dam failed, and was rebuilt, under plans prepared by this department, by the forces of the Superintendent of Public Works.

Last spring's freshets washed out the westerly approach to the bridge over Clear Creek, on the Cattaraugus Creek Indian Reservation, built under chapter 419, Laws of 1900, and the

creek has permanently changed its channel. I recommend the construction of one more span of sixty-five feet to meet the altered conditions.

At frequent intervals I am called upon to stake out the "Blue Line," and to otherwise locate the boundaries of the canal property. The difficulty in the location of the "Blue Line" increases as time goes on, and the structures or other fixed points to which the "Evershed survey of 1872" was connected, are obliterated or altered. Your attention is called to the advisability of a system of permanent monuments locating the boundaries of canal lands. The "Blue Line" maps on file in this office should be compared and corrected annually, at least, with those in the office of the State Engineer and Surveyor, and made to conform with abandonments or appropriation of State lands. No final record showing the disposition of cases of this nature now reaches this office after the surveys are made.

In years past it has been my custom to make an inspection, in the fall of the year, of the structures on this division, and to report their condition and necessities in my annual report. This has been a task entailing much time and arduous work, but as the responsibility for the condition of these structures does not rest upon this department, and as their condition seems essentially unchanged, I have been content to investigate, prepare plans, or give such aid only as called upon.

Considerable trouble has been experienced during the past season with lift-bridges, resulting in delays to either navigation or street traffic, or both, due to the breaking down and failure of bridges to operate. I am informed that the services of a skilled bridgeman, to take general supervision of these bridges, have been procured jointly by the State and the city of Rochester, which will probably insure their more satisfactory operation.

EXTRAORDINARY REPAIRS.

During last winter a party was kept in the field staking out and otherwise aiding the Department of Public Works in carrying on the work and repairs done under chapter 347, Laws of

1901, consisting of a new berm abutment for Drake's Bridge, No. 60; strengthening banks, repair of aqueducts, ditching creek north of culvert No. 69; repairing abutments of bridges No. 166 and 167; repairing vertical walls, north abutment of the Tonawanda Dam; pile and timber docking Tonawanda Creek; repair of culverts, sections IX and X; repair of locks, section VIII and IX; repair of bridge abutments, sections IX and X, and repair of vertical walls, section IX.

FOR CONSTRUCTING A STEEL FOOT BRIDGE OVER THE ERIE CANAL AT LYELL AVENUE, IN THE CITY OF ROCHESTER, MONROE COUNTY, N. Y.

Chapter 645, Laws of 1901.

American Bridge Co., contractors.

| | |
|------------------------------------|---------------|
| Plans approved by Canal Board..... | July 2, 1901 |
| Contract dated | July 30, 1901 |
| Contract to be completed..... | Nov. 1, 1901 |
| Work begun | June 20, 1902 |
| Contract completed | July 26, 1902 |
| Appropriation | \$3,000 00 |
| Engineer's estimate | 2,704 00 |
| Contract price | 2,427 50 |
| Final estimate | 2,371 10 |

Philip H. Dater, in charge.

This is a foot bridge erected on the southerly side of the Lyell Avenue lift bridge (operated by the city of Rochester) and was built to enable a large number of working people to get across quickly during the time of repair or when the highway bridge is raised, and consists of a plate girder 100 feet center to center of end posts, 8 feet center to center of girders, the height of the girders being 5 feet 4½ inches, supplied with cast-iron stairways at either end.

The iron work was constructed by the American Bridge Co. The piers and flooring were put in by the Department of Public Works.

There was great delay in the construction of this bridge, it having been completed nearly ten months after contract time.

**FOR CONSTRUCTING A LIFT BRIDGE OVER THE ERIE CANAL AT
CHAPEL STREET, IN THE CITY OF LOCKPORT, N. Y.**

Chapter 573, Laws of 1899; chapter 16, Laws of 1900.

Havana Bridge Works, contractors.

| | | |
|------------------------------------|-------|-------------|
| Plans approved by Canal Board..... | Oct. | 11, 1899 |
| Contract dated | April | 24, 1900 |
| Contract to be completed..... | April | 1, 1901 |
| Work begun | Nov. | 14, 1900 |
| Contract completed, | Oct. | 26, 1901 |
| Appropriation, | | \$24,000 00 |
| Engineer's estimate | | 14,909 60 |
| Contract price | | 18,915 00 |
| Final estimate | | 19,621 67 |

Garret O. House, assistant engineer, in charge.

The old cast-iron Whipple arch formerly at this site failed during the canal improvement, winter of 1897 and 1898. Owing to the excessively steep approaches, — impossible of remedying if an overhead bridge was placed here, due to topographic conditions, — it was deemed advisable to provide a lift bridge.

The new structure consists of two riveted trusses 111 feet in length, affording a roadway 20 feet wide and two walks, each six feet in the clear.

The movable portion of the bridge is suspended upon cables passing over sheaves located in towers about 24 feet high at the corners. Cast-iron counterweight is provided so that the bridge is always in equilibrium. About a ton of counterweight has also been placed on the bridge floor which may be moved to take up changes in the weight of the floor, produced by the elements.

Water power, carried to a cylinder, located beneath the bridge floor, through telescopic supply pipes, located in the berm towers, actuates a rack and pinion operating drums which raise or lower the bridge through the agency of a system of cables.

This bridge was designed to operate under a pressure of 70 pounds, the pressure supposed to be maintained in the city mains; however, due to increased consumption, the pumping

plant is being overtaxed, and, at times, the pressure has dropped as low as 45 pounds, rendering the operation of the bridge impossible, and endangering the structure.

Although the work was begun prior to the close of navigation, progress was slow and the contract time greatly exceeded.

Owing to the low and fluctuating water pressure which the city of Lockport was able to furnish, after the completion of the bridge it was found necessary to put in another cylinder, placed tandem to the original cylinder, so as to provide sufficient power to operate the bridge under all conditions. The second cylinder was put in place by the Department of Public Works, before the opening of navigation last spring.

FOR CONSTRUCTING A LIFT BRIDGE OVER THE ERIE CANAL AT WEST AVENUE, IN THE CITY OF ROCHESTER, N. Y.

Chapter 549, Laws of 1899 and chapter 687, Laws of 1901.

Havana Bridge Works, contractors.

| | | |
|------------------------------------|-------|-------------|
| Plans approved by Canal Board..... | Aug. | 16, 1900 |
| Contract dated | Oct. | 19, 1900 |
| Contract to be completed..... | April | 1, 1901 |
| Work begun | Nov. | 1, 1900 |
| Contract completed | Aug. | 1, 1902 |
| Appropriation | | \$75,000 00 |
| Engineer's estimate | | 67,294 00 |
| Contract price | | 68,528 70 |
| Final estimate | | 67,838 57 |

Philip H. Dater, in charge.

The bridge built under this act replaces a wrought-iron lift bridge, which consisted of two roadways 20½ feet in the clear and two sidewalks 7½ feet in clear width, built in 1889, and which was a constant annoyance to the population living beyond, due to the large portion of the time that it was hung up for repairs. The large skew of the bridge, amounting to about 45 degrees, together with its considerable width, makes it the heaviest lift bridge on the Western Division.

The work of taking down the old bridge was begun early in the fall of 1900, so that with the close of navigation, work might be started on the construction of the new substructure and the erection of the new superstructure. The work on the substructure was carried on with vigor and completed within a reasonable time, but for various reasons the work on the superstructure was delayed, so that the work covers upwards of a year and a half. Part of this delay was due to the difficulty the contractor had in procuring structural metal, and the general shortage in the metal market.

The structure built under this act is of a unique design and novel, consisting of two steel tanks submerged in concrete-lined pits filled with water, supporting the trusses at either end, and of such displacement that the superstructure is in equilibrium at any point in the travel of the bridge, it being raised and lowered by two 25 horse-power electric motors, suitably equipped with automatic cut-offs, located under the movable floor and transmitting the power through cables to the four fixed towers at the corners of the bridge. The current is conveyed to the motors through the instrumentality of trolleys located in the berm tower.

The lift of the bridge is 10.75 feet; the length 97 feet 2 5/8 inches at right angles to the canal and 139 feet 6 inches center to center of end posts. The roadway is 43 feet center to center of trusses and the sidewalks 10 feet 6 inches. Stairways are provided on the southerly side for foot traffic when the bridge is raised, but as yet these have not been used.

A double-track electric railway is carried across the structure. The grade of adjoining streets had to be altered to meet the new elevation of the floor of the bridge, entailing the reconstruction of the pavements and sidewalks in the vicinity.

The design of the bridge is not only unique but graceful and of artistic merit. A system of electric pumps has been installed in the tanks to drain them in case of emergency or leaks.

Although minor accidents have occurred, the operation of this bridge, during the past season has been a source of pleasure to the public and to those in charge of it.



ROCHESTER, MONROE COUNTY, N. Y.: WEST AVENUE LIFT-BRIDGE.

DESIGNED AND BUILT BY THE STATE ENGINEER, 1900-1902.

Span, 139½ feet: Width over all, 64 feet: Lift, 10½ feet: Operated electrically.

The design is original, the bridge being balanced on totally immersed steel pontoons.

Appropriation by Chap. 549, Laws of 1899, \$75,000. Cost completed, \$74,975.75.

**FOR CONSTRUCTING AN ARCH BRIDGE OVER THE ERIE CANAL AT PINE
AND LOCK STREETS, IN THE CITY OF LOCKPORT, N. Y.**

Chapter 430, Laws of 1900.

Niagara Construction Company, contractors.

| | |
|--|---------------|
| Plans approved by the Canal Board..... | Oct. 5, 1900 |
| Contract dated | Nov. 27, 1900 |
| Contract to be completed..... | May 1, 1901 |
| Work begun | Dec. 27, 1900 |
| Contract completed (as arranged by the Superin-
tendent of Public Works)..... | Feb. 8, 1902 |
| Appropriation | \$75,000 00 |
| Engineer's estimate | 64,743 00 |
| Contract price | 51,769 80 |
| Final estimate | 51,758 33 |

Garret O. House, assistant engineer, in charge.

The old structure consisted of two spans 112.5 and 54.0 feet, Whipple trapezoidal trusses, which carried a 20-foot roadway and two five foot sidewalks.

The new superstructure consists of a steel arch bridge with four plate girder ribs supporting a 40-foot roadway, paved with brick laid upon buckle plates and two 13-foot, concrete and steel sidewalks. The skew is 23 degrees 45 minutes and clear span center to center of end pins is 164 feet.

New ashlar faced, concrete backed abutments were provided. The original plans contemplated the use of a portion of the old berm abutment, which was found unsuitable, and this abutment was rebuilt of concrete up to the underside of the belt course, under the thrust blocks, the remainder being concrete faced with ashlar.

The plans, specifications and estimates of cost for both the sub and superstructure were prepared by the Department of Bridges. This work was essentially completed last winter, but minor defects appeared, due to climatic conditions which could not be remedied until favorable weather prevailed. The Superintendent of Public Works determined to terminate the contract November 8, 1902, and remedied the above-mentioned defects last spring with funds deposited by the contractor.

**FOR THE IMPROVEMENT OF GLEN CREEK, BETWEEN THE NORTHERN
CENTRAL RAILWAY AND THE CHEMUNG CANAL, IN THE VILLAGE
OF WATKINS, SCHUYLER COUNTY, N. Y.**

Chapter 699, Laws of 1901.

Marson & Ryan, contractors.

| | | |
|---|------|------------|
| Plans approved by State Engineer..... | Aug. | 27, 1901 |
| Contract dated | Oct. | 9, 1901 |
| Contract to be completed..... | Nov. | 23, 1901 |
| Extension of time of completion by Superin-
tendent of Public Works..... | Dec. | 15, 1901 |
| Last work | Jan. | 28, 1902 |
| Appropriation | | \$6,057 83 |
| Engineer's estimate of cost..... | | 4,886 60 |
| Contract price | | 4,913 00 |
| Final estimate | | 4,875 24 |

Fred W. Hamilton, rodman, in charge.

Glen Creek is the stream flowing through Watkins Glen. Originally it emptied into Catherine Creek about a quarter of a mile from Seneca Lake. The rock formation through which it passes is of a soft argillaceous nature, resulting in the bringing down of large quantities of gravel during high water and depositing it where slack waters are reached. Probably for this reason, many years ago, the channel of Glen Creek was diverted to the north and west, so that it emptied into Seneca Lake, about 600 feet west of the Chemung Canal.

Chapter 140, Laws of 1895, appropriated \$5,000 for repairing the banks and cleaning out this creek, the deposits of gravel having so choked its channel that dykes had been necessary to confine the creek within its banks. Under this act an earth dyke, protected by a pile and plank structure, was constructed, and a channel cut connecting the creek with the Chemung Canal.

Under chapter 624, Laws of 1898, chapter 418, Laws of 1900, and chapter 447, Laws 1900, funds were provided and used for repairing this dyke.

Owing to the short life of timber in this work it was deemed advisable to provide a more permanent construction under



LOCKPORT, NIAGARA COUNTY, N. Y. : PINE STREET BRIDGE.
DESIGNED AND BUILT BY THE STATE ENGINEER, 1901 AND 1902.
Span 164 feet; length 173 feet; width over all 66 feet.
Appropriation by Chap. 450. Laws of 1900, \$75,000. Cost completed, \$59,317.35

chapter 699, Laws of 1901, consisting of a concrete slope wall six inches in thickness, as a protection to the gravel banks, which were stable in themselves, but porous and subject to erosion during the high water. The contract was let for this work October 9, 1901, calling for the completion of same within 45 days, which time of completion was subsequently extended by the Superintendent of Public Works to December 15, 1901. On December 14, 1901, just before the completion of the work, a severe storm occurred, damaging it very severely. Temporary repairs were made during January, 1902. During March this section was again subjected to further floods, and on July 5, 1902, high water added further damage to the work. An inspection made by the Superintendent of Public Works and the State Engineer, led to their determination that the contractor had fulfilled his contract and of their acceptance of it.

FOR CONSTRUCTING A VERTICAL WALL ON THE SOUTH SIDE OF THE ERIE CANAL, FROM THE WEST SIDE OF BRIDGE NO. 131, IN THE VILLAGE OF EAGLE HARBOR, ORLEANS COUNTY, N. Y.

Chapter 686, Laws of 1901.

Crahan & Kearns, contractors.

| | |
|--|---------------|
| Plans approved by the Canal Board..... | Aug. 27, 1901 |
| Contract to be completed..... | April 1, 1902 |
| Work begun | Dec. 9, 1901 |
| Contract completed | April 5, 1902 |
| Appropriation | \$4,000 00 |
| Engineer's estimate | 3,388 75 |
| Contract price | 3,008 75 |
| Final estimate | 3,059 67 |

Tracy B. Smith, rodman, in charge.

The work done under this contract consisted in rebuilding an old vertical wall — which had fallen down — on the berm side of the canal, extending from bridge No. 131 westerly for a distance of about 350 feet, and the bottoming out of the prism of the canal adjacent thereto, thus enabling the loading of boats at this point. The new wall consists of concrete and extends

from 9½ feet below, to 2 feet above water level, the section of the wall being 1½ feet wide on top and 4½ feet at the bottom, with a footing course 1 foot deep extending 6 inches beyond the wall.

The contractors for this work showed commendable zeal and completed the contract work within the contract time, the work done after the date of completion being bottoming out of the prism of the canal under a supplementary agreement, dated February 3, 1902.

FOR CONSTRUCTING A LIFT BRIDGE OVER THE ERIE CANAL AT PLYMOUTH AVENUE, IN THE CITY OF ROCHESTER, MONROE COUNTY, N. Y.

Chapter 732, Laws of 1901.

Owego Bridge Company, contractors.

| | |
|------------------------------------|----------------|
| Plans approved by Canal Board..... | Jan. 21, 1902 |
| Contract dated | April 24, 1902 |
| Contract to be completed..... | April 1, 1903 |
| Appropriation | \$50,000 00 |
| Engineer's estimate | 42,015 00 |
| Contract price | 43,320 00 |

The contract for this bridge contemplates the removal of the present lift bridge, erected at this site in 1888, and delivering the same at the site of Fullam's Basin Bridge, No. 47, for re-erection. The proposed new structure consists of a pony truss bridge with curved upper chord, 108 feet 6½ inches center to center of fixed posts, carrying a roadway 37 feet in the clear, and two walks 10 feet wide. The bridge is supported upon two pontoons each 54 feet 6 inches long and 8 feet and ¼-inch square on the ends, being so designed as to raise the bridge without power through their buoyancy in the water—in which they are immersed—contained in concrete-lined pits. The bridge is lowered by a system of gears, operated by two 25 horse-power electric motors, located on shore, suitable switch boards, brakes

and other controlling devices being provided. This bridge is of the same type as the West Avenue bridge completed during the past two years, improvements in which have been made in the present plans. It is hoped to have the present superstructure removed before the close of navigation, thus permitting prompt work upon the new bridge, with the expectation of its completion for the opening of navigation in 1903.

FOR THE CONSTRUCTION OF A SEWER TO DRAIN THE DRY DOCK AT
LOCK NO. 66, ERIE CANAL.

Chapter 645, Laws of 1901.

Appropriation \$850 00

This work was done by the forces of the Department of Public Works upon plans prepared in this office, and consists of a 12-inch cast-iron pipe from the westerly end of the dry dock at lock No. 66, westerly 264 feet, to the east side trunk sewer, providing means of suitably draining the dry rock during the operation of the canal.

FOR THE FURTHER IMPROVEMENT OF EIGHTEEN-MILE CREEK, IN
THE COUNTY OF NIAGARA.

Chapter 645, Laws of 1901.

Appropriation \$3,000 00

This work consisted of removing two old timber pony trusses from the crossing of Warren's road over Eighteen-Mile creek, and the removal of the center pier and adjacent bar, and the construction of concrete abutments and the erection of a second-hand steel superstructure procured from the N. Y. C. & H. R. R. Co. The dimensions are as follows: Fifteen feet center to center of trusses; clear width of roadway, 12 feet; length over all, 67 feet; clear span, 61 feet 6 inches; height of trusses, 7 feet 1 inch.

The entire work was done by the forces of the Department of Public Works, plans and specifications being by this department.

FOR THE CONSTRUCTION OF A SWING BRIDGE OVER BLACK ROCK HARBOR, AT FERRY STREET, IN THE CITY OF BUFFALO, ERIE COUNTY, N. Y.

Chapter 618, Laws of 1899; chapter 696, Laws of 1901.

Owego Bridge Works, contractors.

| | | |
|------------------------------------|-------|-------------|
| Plans approved by Canal Board..... | Oct. | 17, 1901 |
| Contract dated | April | 24, 1902 |
| Work begun | Sept. | 1902 |
| Contract to be completed..... | Jan. | 1, 1903 |
| Appropriation | | \$30,000 00 |
| Engineer's estimate | | 24,307 00 |
| Contract price | | 26,860 50 |

D. D. Waldo, assistant engineer, in charge.

The present bridge at this site is an antiquated plate girder swing bridge, which has been damaged by being struck by passing vessels. This bridge leads to the ferry across the Niagara River, as well as to excursion docks where upwards of a million passengers embark during a season. The bridge has no provisions for pedestrians, and owing to the lack of proper facilities for foot passengers it has been a serious inconvenience, not to say a danger, to the confused mass of teams and people coming or going to the boats at this point.

The new structure consists of concrete abutments and piers superimposed upon timber rock-filled cribs below water, and timber protection piers. The superstructure consists of a plate girder bridge 132 feet 2½ inches out to out, 18 feet center to center of girders, with two overhanging walks 6 feet 6⅝ inches wide. Maximum height of girders 7 feet ½ inch. The clear width of channel on either side of the center piers is 46 feet 8 inches, the size of boat passing through being governed by the ship lock at Black Rock.

Progress upon this bridge has been slow, the only work done being the delivery of timber and partial framing of the cribs. It is evident, at this time, that the contractors will not complete their work within the contract time.

FOR DEEPENING AND IMPROVING ERIE BASIN, AT BUFFALO, FROM
BUFFALO RIVER NORTHERLY TO SLIP NUMBER TWO.

Chapter 595, Laws of 1902.

| | |
|--|----------------|
| Plans approved by the Canal Board..... | Sept. 19, 1902 |
| Appropriation | \$50,000 00 |
| Engineer's estimate of cost..... | 45,275 00 |

The act authorizing this work specifies that 22 feet of water shall be provided below "mean lake level" as established by the United States Government, limits the width of the channel to 150 feet, and stipulates that the work shall begin at the Buffalo River end.

The preparation of plans for this work entailed difficulties at the start, as it was known that the entire work which the act covers could not be accomplished within the amount appropriated. It, therefore, became necessary to so prepare the plans as to gain the greatest and best results with the money available, and relieve the needs of commerce at this point. After conferences with shippers, vessel men and others interested, the plans were prepared for improving an area of about four acres, being as much as it was believed could be improved under the appropriation, with an elastic clause permitting a reduction of area — in the event of the bids requiring such a course. However, all bids received were so high that they were rejected by the Superintendent of Public Works and the work is about to be re-advertised.

The act provided that the Superintendent of Public Works might do such of the work as seemed best by his own forces, without contract. Owing to the large number of boulders and other obstructions in the channel their removal seemed imperative for the safety of commerce, and with suitable derrick boats, and a diver, obstructions were removed as shown by a report of the Assistant Superintendent of Public Works which shows that there were thus removed thirteen water-soaked piles and pieces of timber, one large stump, various other obstructions, and 189 pieces of stone varying in size from a minimum of one cubic foot

to a maximum of $11\frac{1}{2}$ cubic yards each, including 62 pieces which exceeded 1 cubic yard each. These were all removed from the channel between Buffalo River and the Coit Slip with the result of making a marked improvement in the navigability of the channel.

**FOR CONSTRUCTING A BRIDGE OVER THE CLARK & SKINNER CANAL
AT OHIO STREET, IN THE CITY OF BUFFALO, ERIE COUNTY, N. Y.**

Chapter 695, Laws of 1901.

| | |
|--|---------------|
| Plans approved by the Canal Board..... | Jan. 21, 1902 |
| Appropriation | \$25,000 00 |
| Engineer's estimate of cost..... | 19,500 00 |

Plans for a plate girder bridge, with solid floor and two walks, were prepared, but owing to the fact that the Hamburg Canal has been closed and disposed of, and the consequent rendering of little value of the Clark & Skinner Canal, and its probable abandonment, the construction of this bridge has been deferred.

**FOR THE ERECTION OF THE PRESENT PLYMOUTH AVENUE LIFT
BRIDGE, ROCHESTER, AT THE SITE OF THE FULLAMTOWN BRIDGE,
No. 47, AND THE CONSTRUCTION OF NEW ABUTMENTS THEREFOR.**

Chapter 594, Laws of 1902.

| | |
|---------------------|------------|
| Appropriation | \$8,000 00 |
|---------------------|------------|

The present superstructure of the Plymouth Avenue lift bridge is to be taken down, remodeled, and erected on new concrete abutments, at the site of Fullamtown bridge No. 47. This bridge has always operated satisfactorily, and is being removed from Plymouth Avenue owing to its narrow roadway and lightness for the heavy city traffic now using it, and should be a satisfactory bridge when re-erected, as well as doing away with the long and heavy grade on the towpath approach to the present bridge at Fullamtown. The work is to be done the present winter, by the forces of the Department of Public Works.

FOR CONSTRUCTING A BRIDGE OVER THE ALLEGANY RIVER, ON THE ALLEGANY INDIAN RESERVATION, NEAR ONOVILLE, TOWN OF SOUTH VALLEY, CATTARAUGUS COUNTY, N. Y.

Chapter 467, Laws of 1902.

William H. Schmidt, contractor.

| | | |
|---|-------|-------------|
| Plans approved by State Engineer and Surveyor.. | July | 31, 1902 |
| Contract dated | Sept. | 18, 1902 |
| Contract to be completed..... | July | 1, 1903 |
| Work begun | Oct. | 20, 1902 |
| Appropriation | | \$29,000 00 |
| Engineer's estimate of cost..... | | 24,954 00 |
| Contract price | | 25,311 50 |

Philip H. Dater in charge.

The plans contemplate the removal of the present unsafe and singular bridge, consisting of seven suspended spans of cable supported upon pile bents, so built that a load on any one panel takes up the slack in all of the other panels to the ends; the cable moving over the tops of the piles. Why this bridge has stood is one of the freaks of nature, unaccounted for by any who have seen it.

The new bridge to be erected will consist of four spans, 123 feet 1 inch, clear span; 18 feet 3 inches center to center of trusses, with a substructure consisting of three piers and two abutments built of concrete. The floor of the bridge will be about 20 feet above the bed of the river during low stages, which fluctuates in depth at different seasons, from less than a foot to fifteen feet. At this time the contractor is making preparations to proceed with the substructure.

FOR THE CONSTRUCTION OF A BRIDGE OVER THE CATTARAUGUS CREEK, AT VERSAILLES, ON THE CATTARAUGUS INDIAN RESERVATION, BETWEEN THE TOWNS OF PERRYSBURG, CATTARAUGUS COUNTY, AND COLLINS, ERIE COUNTY, N. Y.

Chapter 685, Laws of 1901.

Owego Bridge Company, contractors.

Plans approved by State Engineer and

| | |
|---------------------------------------|----------------|
| Surveyor | Sept. 12, 1901 |
| Contract dated | Oct. 29, 1901 |
| Work to be completed | July 1, 1902 |
| Work begun | Aug. 11, 1902 |
| Appropriation | \$17,000 00 |
| Engineer's estimate of cost | 14,448 00 |
| Contract price | 14,941 00 |

Philip H. Dater, in charge.

The old bridge at this site consisted of a three-span combination Howe bowstring covered bridge, built many years ago, and which was in a most dilapidated condition. The two masonry piers were in fair condition, and were remodeled to suit the new superstructure, and voids thoroughly grouted. New concrete abutments were built. The steel superstructure consists of three spans, of the deck type, 119 feet 5 inches center to center of end pins; 12 feet 6 inches center to center of trusses; and 10 feet center to center of chords. Cantilever floor beams, 22 feet long, are used and steel stringers, carrying a roadway 15 feet wide between wheel guards, and a walk upon one side 4 feet 6 inches wide. The foot traffic upon this bridge is inconsiderable, save for children crossing to and from school; but it was deemed advisable to provide a walk owing to the length of the bridge, as a protection to the children in the case of runaways, which have been frequent at this point.

It is expected that this work will be completed by the middle of November, 1902,

**FOR REPAIRING THE DYKES AND BANKS OF THE CHEMUNG RIVER
IN THE CITY OF ELMIRA, N. Y.**

Chapter 475, Laws of 1902.

Plans approved by the State Engineer and Sur-

| | | |
|---------------------------------------|----------|-------------|
| veyor | Aug., | 1902 |
| Work begun | Oct. 13, | 1902 |
| Appropriation | | \$15,124 00 |
| Engineer's estimate of cost | | 12,635 75 |

J. B. Barrett, leveler, in charge.

Along the southerly bank of the Chemung river, within the limits of the city of Elmira, various forms of earth and pile dykes have been built, by either the State or private individuals, as a protection from high water, and on the northerly side of the river from Madison avenue easterly, for about 1,700 feet, the State, several years ago, constructed a pile dyke.

On December 14, 1901, this locality was visited with extremely high water, and all of the dykes were more or less damaged, particularly the earth dyke on the southerly side of the river, easterly of Madison avenue, where two serious breaks occurred.

The work to be done under these plans contemplates the repair of these dykes, and is to be done by the forces of the Department of Public Works.

REPAIR OF SPILLWAY, CUBA RESERVOIR, ALLEGANY COUNTY, N. Y.

Chapter 644, Laws of 1901.

The spillway of this reservoir empties into a channel of rapid fall conveying its waters into Oil Creek. During the past summer the large volume of water and its great velocity caused a scouring of the outlet channel back to the vicinity of and threatened to undermine the spillway. At the request of the Assistant Superintendent of Public Works, alternate plans for a concrete and paved apron protecting the outlet channel and spillway were prepared, at an estimated cost of about \$3,500, and the Department of Public Works are making preparations to proceed with the work.

DREDGING OUTLET OF CASSADAGA LAKES, CHAUTAUQUA COUNTY, N.Y.**Chapter 594, Laws of 1902.**

Under this act \$4,000 was appropriated for dredging the outlet of these lakes, and, at the request of the Department of Public Works, a party was assigned to take levels and render such aid as might be required.

COURT OF CLAIMS AND OTHER SURVEYS.

During the past year considerable work has been done in the nature of making surveys and preparing cases for the Court of Claims.

All demands for surveys for abandonment of lands, location of blue lines, etc., have been met as promptly as circumstances permitted. This work has been carried on under the direct supervision of the resident engineer.

HIGHWAY IMPROVEMENTS.

While the contracts for the roads were let earlier than in previous years, this has been a most difficult season on this division for the construction of roads, due to not alone the heavy but frequent rainfalls. The sub-grade, for long periods, would hardly dry out so stone could be laid between showers, and the hope that the wet summer would be followed by a dry fall has not been realized. This has disorganized the work, and prevented the carrying out of any well-defined plans upon the part of the contractors; most of the time they have had to discard the usual order and do such work as the conditions would permit.

Most of the contractors started their grading promptly, but were disappointed in the time of the arrival of new crushing machinery, delaying the laying of stone, and necessitating going over their sub-grade several times.

- The remarkable prosperity of the country, with the consequent carrying on of much construction, has made the question of securing sufficient labor a serious problem, at any price. Twenty cents an hour, with, in many cases, bonuses, such as street car fare, etc., have often not proved sufficiently alluring to procure

necessary labor, with the result that it has become much more independent, and the amount of work performed noticeably reduced.

The plans and estimates of many of the roads let this year were prepared before the advent of prosperous times and the present high prices of material and labor, with the result that it proved necessary in many cases to revise the plans that the work might be contracted for within the amounts available. This was largely done by the substitution of local or more inexpensive stone for trap rock originally specified.

All plans were revised before letting, and the use of concrete culverts suitably reinforced by expanded metal, and structural shapes were substituted for pipe culverts—previously used. The pipe culverts only being retained in the plans where some special feature made it desirable. In general the culverts accord with the standards submitted by me and approved by you March 20th last, special cases still being provided with a detail in accord with its requirements. These culverts have been used sufficiently at this time to indicate not only the stability of their design, but their satisfactory appearance, and facility of construction. Collapsible forms for the various sizes, varied by the ingenuity of the different contractors, tend to economical construction. The experiment of dividing the roads to be constructed into groups, governed by their location, difficulties and extent; placing each group under the responsible head of an assistant engineer, with suitable men to aid, has been tried during the past season, with the idea of economy of both men and money. While, in many ways, this has been successful, yet not altogether so. I have noticed there is not the same familiarity with the plans and details; that contractors are apt to get started wrong, and that the many little details so essential to a good road cannot be as well looked after, as when the road has a separate responsible man in charge, with nothing but that particular road to engross his attention.

Your attention is respectfully directed to the fact that the commercial products of the large producers of crushed stone in this

section do not exactly conform with the state specifications, as regards sizes. And to the difficulty in procuring stone, for this reason, especially as the demand for their output is so great that they will not change their screens to meet demands for the amount used on the state roads. I would recommend that upon roads where local stone is used that the metalling be spread in two equal courses and that 1 inch to 2½ inches stone be permitted for both courses, thus enabling the use of the commercial product in this vicinity, as well as aiding the contractor in the construction of the road; as with but one size of stone to deal with, he can use what he may have delivered for either course as the occasion may prove most advantageous, thus eliminating a cause of considerable trouble where stone is shipped in *i. e.*, top stone arrives when bottom stone is most needed and *vice versa*.

The fundamental principle of the preservation of street and highway improvement is, in my judgment, the distribution of traffic over the entire width, as against its being confined in tracks to small areas. It has been my observation that, not alone upon macadam roads, but upon city streets well paved with stone, brick and other materials, that where, for some reason traffic is restricted to one track, that ruts and holes appear with their attendant pools of water in wet weather hastening the ruin of the roadway. I, therefore, note with much concern the agitation, in some quarters, towards the use of various types of wheel-tracks, based largely upon short experimental sections, laid under favorable conditions. The theory that traction is reduced and that larger loads can be hauled than over a well-kept macadam surface is, I believe, a fallacy, unless some means of keeping off mud, stones and other material can be devised. When this is accomplished the smooth surface of the wheel-way will not present as sure a foothold for the animal, and the reduction, if any, in traction will probably be offset by the reduced hauling power of the horse. Were the wheel-tracks so narrow that the team could travel between them, two depressions along the insides of the track are bound soon to appear, with standing water hastening the

destruction of the road, and a heaving of the wheel-way when the frost leaves the ground in the spring, due to moisture, sure to get through the surface. The varying lengths of axles, the turning on and off the track, and the inability of drivers to follow a straight path will soon cause the brick or stone, if so constructed, to "kick up" on the ends.

A brick-track road has, during the past year, been built by Erie county through the incorporated village of Bladell, on the White's Corners road, being about 6,000 feet in length, and closing a gap in the improvement of this road made during 1898 and 1899, under chapter 115, Laws of 1898. The traffic upon this road is not only extensive, but the loads are large. The road has only been completed a short time, so no fair estimate of its enduring qualities or success can be made at this time. Traffic now uses a considerable area of the road, and for long stretches the bricks are not visible upon the surface.

It has been my pleasure and profit to inspect the macadam roads being built by the town of Canandaigua, Ontario county, started by the present supervisor, Ira P. Cribb, and ably continued by the present highway commissioner, Fred P. Douglas. The town owns a portable plant, consisting of crushers, bin and toolhouse, all upon wheels, moved from place to place and operated by a steam road roller. No attempt is made to reduce grades, owing to the limited funds available; all of the grading being done by the skillful use of a road scraper. But 6 to 8 feet width of stone is spread, but wide wings are provided, resulting in the use of the macadamized portion only during wet weather. I have been remarkably impressed with the excellent results produced at small cost. The stone costs the town nothing. Constant maintenance results in the present good condition of roads built several years ago.

The maintenance of the improved roads, notwithstanding the additional authority conferred by chapter 53, Laws of 1902, still continues a serious problem. I have personally inspected every road upon my division from two to five times, and used every manner of persuasion known to me upon the various highway

commissioners, but with discouraging results. With the limited number of experienced engineers which I have had during the past season, it has been a difficult matter to follow up these matters, and secure satisfactory results. I would recommend that another year, a man familiar with the practical construction of roads be employed solely to constantly inspect the roads, follow up the highway commissioners until repairs are made; and, in the event of the failure of the commissioner, to have power to make the repairs himself at the expense of the county. Two counties upon my division are provided with steam rollers, but my efforts to have them used upon the roads has proven unavailing.

Your attention is called to the hardship caused contractors through the retention from the monthly estimates of 25% until the completion of the work. This, I am aware, is in accord with paragraph 8 of chapter 115, Laws of 1898, but I am informed, by the framer of the law, was inserted through misinformation. With the first cost of a plant, and the percentage retained, the contractor is constantly putting money into the work, as the margin of profit is surely less than the percentage retained. Upon other State work but 10% is retained, surety bonds being required in both cases.*

Much difficulty has been experienced in procuring enough engineers in the higher grades during the past season, which has been a serious embarrassment in the carrying on of the work. Could some means of employing more in the winter, thus insuring a surer tenure of employment, the work would prove more alluring to the class of men most needed, and prove more economical in the long run to the State.

While with the considerable number of new men employed this year there have been times when cases requiring disciplining have arisen, on the whole, those employed under my direction have rendered valuable and faithful services to the state in accord with their individual ability.

* Law has since been amended reducing retention to 10%.

SOUTHPORT ROAD, SECTION TWO, No. 28, CHEMUNG COUNTY, N. Y.

Chapter 115, Laws of 1898.

Swan & Murray, contractors.

Length, 3.408 miles; width of metalling, 16 feet.

| | | |
|---|------|-------------|
| Plans approved by Board of Supervisors..... | Oct. | 2, 1900 |
| Contract dated | July | 17, 1901 |
| Contract to be completed..... | Oct. | 15, 1901 |
| Work begun | July | 22, 1901 |
| Work completed | May | 31, 1902 |
| Engineer's estimate of cost of work (revised).... | | \$34,131 68 |
| Contract price | | 33,108 00 |

T. W. Barrally, assistant engineer, in charge.

This road is a continuation southerly of Southport Road, section 1, and extends from Pine City to the Pennsylvania State line. The metalling consists of a 4-inch foundation course of local stone, quarried near Seelye Creek, bound with its own screenings, with a 2-inch top course of trap rock bound with Leroy limestone screenings and covered with a wearing coat of Leroy screenings, the width of the metalling being 16 feet, and the total width between shoulders 20 feet. This road was completed in the fall of 1901, except the 30 days maintenance required by the contract. On December 14, 1901, this locality was visited by a cloud-burst, resulting in the streams overflowing their banks, and seriously damaging property, bridges, etc. This improvement also suffered much damage particularly where it crosses Seelye Creek.

While this damage occurred prior to the technical acceptance of the road, it could not have been prevented by the contractor. A supplemental agreement was therefore made under date of April 2, 1902, whereby an added sum of \$1,200 was allowed the contractors, who restored the road, as part of the cost of same.

SOUTHPORT ROAD, SECTION THREE, No. 29, CHEMUNG COUNTY, N. Y.

Chapter 115, Laws of 1898.

Costello & Neagle, contractors.

Length, 1.06 miles; width of metalling, 16 feet.

| | | |
|--|-------|-------------|
| Plans approved by Board of Supervisors..... | Oct. | 2, 1900 |
| Contract dated | July | 17, 1901 |
| Contract to be completed..... | Oct. | 15, 1901 |
| Work begun | Aug. | 24, 1901 |
| Work completed | April | 26, 1902 |
| Engineer's estimate of cost of work (revised)... | | \$11,700 00 |
| Contract price | | 10,634 00 |

T. W. Barrally, assistant engineer, in charge.

This road is a continuation of Southport road, section 1, completed in 1900, along what is commonly known as Pennsylvania avenue northerly from Bulkhead to the southerly line of the city of Elmira.

The metalling consists of a 4-inch foundation course of local stone from the Grover quarry on the side hill about a mile southerly of Bulkhead, with a top course 2 inches deep of trap rock. Leroy limestone screenings were used throughout. This road was essentially completed about December, 1901, but was damaged by the floods of Dec. 14, 1901, which ran down the major portion of the road, Seelye Creek having left its banks at the southerly end of the road. The surface was somewhat damaged, and the ditches practically obliterated. Under date of April 2, 1902, a supplemental agreement was made whereby the State paid the contractors, as part of the cost of restoring the road, the added sum of \$388.50.

SOUTH BROADWAY, No. 30, CHEMUNG COUNTY, N. Y.

Chapter 115, Laws of 1898.

Costello & Nagle, contractors.

Length, 1.021 miles; width of metalling, 16 feet.

| | | |
|---|------|----------|
| Plans approved by Board of Supervisors..... | Oct. | 2, 1900 |
| Contract dated | July | 17, 1901 |
| Contract to be completed | Oct. | 15, 1901 |

| | |
|---|----------------|
| Work begun | July 18, 1901 |
| Work completed | April 26, 1902 |
| Engineer's estimate of cost of work (revised).... | \$10,100 00 |
| Contract price | 9,167 00 |

T. W. Barrally, assistant engineer in charge.

This road extends from the southerly line of the city of Elmira to the Southport road at Bulkhead.

The metalling consists of a 4-inch foundation course of local stone from the Grover quarry, and a 2-inch top course of trap rock, bound with Leroy limestone screenings.

The work on this road had been completed and the final estimate prepared, but just prior to the expiration of the 30 days when the road would have been accepted by the county it was seriously damaged by the floods of Dec. 14, 1901. This damage was repaired under a supplemental agreement dated April 2, 1902, whereby the contractors were paid \$700 for restoring the road.

FAIRPORT ROAD, No. 60, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Chambers & Casey, contractors.

Length, 3.039 miles; width of metalling, 16 feet.

| | |
|---|---------------|
| Plans approved by Board of Supervisors..... | Jan. 15, 1901 |
| Contract dated | July 15, 1901 |
| Contract to be completed | Oct. 15, 1901 |
| Work begun | July 28, 1901 |
| Work completed | May 31, 1902 |
| Engineer's estimate of cost of work (revised).... | \$32,539 87 |
| Contract price | 32,400 00 |

H. D. Alexander, assistant engineer, in charge.

Extending from the end of East Avenue road No. 5, to Basket Street, about 1,000 feet from the corporation line of the Village of Fairport (the proposed erection of a lift bridge over the canal, thus materially reducing the grade, made the delay of the improvement of the 1,000 feet referred to, advisable), the road consisted of a series of sharp hills and valleys over shifting

sands, bad at all seasons, but particularly so during the dry summer months. The improvement of not only the surface of the road, but of the grades as well, has made this a very much used highway, and has attracted traffic from roads for miles around. The 4-inch foundation of this road is largely built of Leroy limestone, but owing to the inability of the contractors to procure a sufficient quantity, the road was finished after a vexatious delay with Waterloo limestone. The top consists of 2 inches of Hudson River trap rock.

Over Irondequoit Creek, the town of Perinton replaced an inferior iron bridge with a concrete arch of 30-feet span built from plans prepared by and under the direction of this Department.

PITTSFORD ROAD, No. 61, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Whitmore, Rauber & Vicinus, contractors.

Length 1.304 miles; width of metalling, 16 feet.

| | | |
|---|------|-------------|
| Plans approved by Board of Supervisors..... | Jan. | 15, 1901 |
| Contract dated | July | 15, 1901 |
| Contract to be completed..... | Oct. | 15, 1901 |
| Work begun | July | 22, 1901 |
| Work completed | Nov. | 13, 1901 |
| Engineer's estimate of cost of work (revised).... | | \$13,302 54 |
| Contract price | | 13,200 00 |

H. D. Alexander, assistant engineer, in charge.

This road extends from the easterly end of East Avenue road No. 5, improved in 1899 and 1900, to the corporation line of the Village of Pittsford. The subgrade is a light shifting sand at best. The old road was a very hard one for traffic, and during extreme dry weather was almost impassable for teams with loads of any considerable weight. The rolling grade consisting of sharp pitches has been very much improved. This completes an improved highway between Pittsford and Rochester, and has diverted a large traffic both of pleasure and loaded vehicles from shorter but poorer roads. The metalling consists of a 4-inch

foundation course of Leroy and Goodman Street Rochester limestone and a 2-inch top course of Hudson River trap rock. Failure to procure necessary stone from Leroy delayed the completion of this work.

WEST HENRIETTA ROAD, No. 62, MONROE COUNTY, N. Y.

Chapter 115, Laws 1898.

Anderson, Thomas & Brown, contractors.

Length 6.237 miles; width of metalling, 16 feet.

| | | |
|---|------|-------------|
| Plans approved by Board of Supervisors..... | Jan. | 15, 1901 |
| Contract dated | June | 28, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work begun | July | 14, 1902 |
| Work completed, September 30, 1902..... | | 37¢ |
| Engineer's estimate of cost of work (revised).... | | \$55,000 00 |
| Contract price | | 52,200 00 |

H. J. Hemstreet and H. D. Alexander, assistant engineers, in charge.

This road extends from the southerly line of the city of Rochester at Mount Hope Avenue, southerly through the towns of Brighton and Henrietta to the unincorporated Village of West Henrietta; the portion through the town of Brighton has been a particularly bad road at all seasons of the year, the soil being largely of a clayey nature and poorly drained.

This is the first work of this kind undertaken by these contractors; a new plant had to be procured, which, together with inexperience and bad weather, delayed satisfactory progress, but as the season advanced the amount and quality of the work improved. A 4-inch foundation course and 2-inch top course of Leroy limestone, with screenings from same are being used, the foundation course being filled with sand.

It is not expected that over four miles of this road will be completed during this season, but it is also hoped to make the heavy cut and fills at Methodist Hill before closing down the work, so that they may settle during the winter.

SCOTTSVILLE ROAD, SECTION ONE, No. 63, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

John Dunfee & Co., contractors.

Length, 2.254 miles; width of metalling, 16 feet.

| | | |
|---|------|-------------|
| Plans approved by Board of Supervisors..... | Jan. | 18, 1901 |
| Contract dated | July | 2, 1902 |
| Contract to be completed | Oct. | 15, 1902 |
| Work begun | July | 21, 1902 |
| Work completed Sept. 30, 1902 | | 47% |
| Engineer's estimate of cost of work (revised).... | | \$19,700 00 |
| Contract price | | 17,990 00 |

H. D. Alexander, assistant engineer, in charge.

This road runs from the Rochester city line southwesterly to Sand Hill, being part of the contemplated improvement to Scottsville.

The soil is a heavy red clay, making a difficult road to construct during the very wet season we have had. The progress on this road has been slow owing to lack of stone, proper tools and superintendence, with the result that, probably, not more than one-half of the section will be completed during this season.

A 4-inch foundation and 2-inch top course, of Leroy limestone, with screenings of the same stone are being laid, the foundation course being filled with sand.

ORCHARD PARK ROAD, SECTION TWO, No. 66, ERIE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Board of Supervisors of Erie county, contractors.

Mosier & Summers, sub-contractors.

Length, 0.952 miles; width of metalling, 16 feet.

| | | |
|---|------|-------------|
| Plans approved by the Board of Supervisors..... | Feb. | 5, 1901 |
| Contract dated | June | 11, 1902 |
| Contract to be completed | Oct. | 15, 1902 |
| Work begun | July | 21, 1902 |
| Work completed, Sept. 30, 1902 | | 81% |
| Engineer's estimate of cost of work (revised).... | | \$11,600 00 |
| Contract price | | 10,100 00 |

T. W. Barrally, assistant engineer, in charge.

This road is an extension towards Buffalo from Orchard Park road section 1, No. 27, completed in 1901, from Webster's Corners to the Morgan road, and replaces an old plank road. The soil is clayey, little effort to drain in the past having resulted in a very bad road in wet weather.

This road was let to the Board of Supervisors of Erie county, who in turn sub-let the work to Messrs. Mosier & Summers. Owing to delays in procuring a plant and for other unknown reasons, work on this road was not started promptly, and has progressed unsatisfactorily since, although the stone has all been spread, its manipulation has not been completed, and little hopes are entertained of its completion this season.

Constant efforts upon my part have proven unavailing and this work has dragged with seeming no supervision or interest upon the part of the contractors.

Yammerthal limestone from the quarries of the Barber Asphalt Paving Company has been used to make the 4-inch foundation and 2-inch top courses, as well as for screenings.

ORCHARD PARK ROAD, SECTION THREE, No. 67, ERIE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Board of Supervisors of Erie county, contractors.

Mosier & Summers, sub-contractors.

Length, 3.410 miles; width of metalling, 16 feet.

| | |
|---|---------------|
| Plans approved by the Board of Supervisors..... | Feb. 5, 1901 |
| Contract dated | June 11, 1902 |
| Contract to be completed | Oct. 15, 1902 |
| Work begun | Sept. 1, 1902 |
| Work completed, Sept. 30, 1902 | 4% |
| Engineer's estimate of cost of work (revised).... | \$37,500 00 |
| Contract price | 32,600 00 |

T. W. Barrally, assistant engineer, in charge.

This road extends from Morgan road to Potter road, being a portion of an old plank road, the soil being clay and clayey loam, poorly drained at present.

Little has been done on this section save the grading of about a mile of the road for the metalling; and there is no hope of completing this section during the current season. The Town Board of West Seneca, in order to make the road more passable during the winter and spring, have spread a considerable amount of gravel, as the old plank has all been removed.

It is proposed to use Yammerthal limestone for the 4-inch foundation and 2-inch top course and screenings from the quarries of the Barber Asphalt Paving Co. at Buffalo, which will be delivered in cars by the Connecting Terminal Railway, where it crosses the improvement, a pocket trestle being contemplated.

ORCHARD PARK ROAD, SECTION FOUR, No. 68, ERIE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Board of Supervisors of Erie county, contractors.

Mosier & Summers, sub-contractors.

Length, 1.170 miles; width of metalling, 16 feet.

| | | |
|---|------|-------------|
| Plans approved by the Board of Supervisors..... | Feb. | 5, 1901 |
| Contract dated | June | 11, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work not started | Oct. | 1, 1902 |
| Engineer's estimate of cost of work (revised).... | | \$13,000 00 |
| Contract price | | 11,300 00 |

This section extends from the Potter road to the southerly boundary of the city of Buffalo at Seneca street. No work has been done as yet and it is not thought at this time that the contractors will begin the work this season. The old plank formerly on this road was removed by the highway commissioner, under the expectation that the road would be improved this season. It having become apparent that no work will be done, the town has spread gravel over the road as a temporary improvement pending the progressing of the work. Jammerthal limestone is to be used for the metalling.

MAIN STREET ROAD, SECTION ONE, No. 69, ERIE COUNTY, N. Y.**Chapter 115, Laws of 1898.****Board of Supervisors of Erie county, contractors.****Henry P. Burgard, sub-contractor.****Length, 3.415 miles; width of metalling, 16 feet.**

| | | |
|---|------|-------------|
| Plans approved by the Board of Supervisors..... | Feb. | 5, 1901 |
| Contract dated | May | 9, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work begun | June | 16, 1902 |
| Work completed Sept. 30, 1902..... | | 95% |
| Engineer's estimate of cost of work (revised).... | | \$28,000 00 |
| Contract price | | 25,000 00 |

T. W. Barrally, assistant engineer, in charge.

This improvement extends from the northeasterly line of the city of Buffalo to the incorporated village of Williamsville. Owing to proximity of limestone, considerable stone had been put upon this road in years past, which, while rough and uneven, was smoothed out and proved an excellent foundation for the improvement. The county of Erie has supplied most of the stone for this road from a limestone quarry at the county house, located at the Buffalo city line, adjacent to this road. A very complete crushing plant was erected by the county, the quarrying having been done by convicts from the Erie county penitentiary at Buffalo.

Owing to delays in the delivery of the crushing plant, and to getting it in operation, through conflict between county and the Civil Service Commission over guards and expert quarrymen, etc., the contractor erected a temporary crushing plant near Williamsville which produced stone during the early stages of the work.

A novel method of puddling was inaugurated upon this work, owing to the presence of public water supplies at both ends and near the middle of the work; the contractor laid a line of 2-inch wrought-iron pipe, with frequent taps, from which the water was supplied by means of hose, thus eliminating the necessity of sprinkling carts.

This road is essentially completed, except some puddling and cleaning up, and will undoubtedly be finished this season. An electric railway adjoins this improvement for its entire length.

Six inches after rolling of metalling was laid in two equal courses upon this road.

CLIFTON ROAD, No. 78, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

John Dunfee & Co., contractors.

Length, 3.623 miles; width of metalling, 16 feet.

| | |
|---|----------------|
| Plans approved by Board of Supervisors..... | March 26, 1901 |
| Contract dated | July 2, 1902 |
| Contract to be completed..... | Oct. 15, 1902 |
| Work not started | Oct. 1, 1902 |
| Engineer's estimate of cost of work (revised).... | \$31,000 00 |
| Contract price | 29,757 00 |

This road extends from the Scottsville road, now being improved at Sand Hill, westerly to Chili Center. The sub-grade is largely sandy with stretches of clay. It is expected to improve this road with a 4-inch foundation and 2-inch top course of Leroy limestone.

The contractor for this road is also the contractor of the adjoining Scottsville road, section 1, No. 63, and it was expected that the improvement of the former would be carried on after that of the latter. However, the contractor has done nothing upon this contract thus far.

SCOTTSVILLE ROAD, SECTION TWO, No. 79, MONROE COUNTY, N. Y.

Chapter 115, Laws 1898.

Anderson, Thomas & Brown, contractors.

Length 7.537 miles; width of metalling, 16 feet.

| | |
|---|----------------|
| Plans approved by Board of Supervisors..... | March 26, 1901 |
| Contract dated | June 28, 1902 |
| Contract to be completed..... | Oct. 15, 1902 |
| Work not started | Oct. 1, 1902 |
| Engineer's estimate of cost of work (revised).... | \$59,015 62 |
| Contract price | 55,555 00 |

This road follows the west bank of the Genesee River from Sand Hill through the unincorporated village of Scottsville to Allens Creek. The northerly end of this road is overflowed almost annually. Under the improvement the grade for nearly two miles will be raised above the normal high water of the Genesee River, but not above the extreme high water. The large cost of raising the road above extreme high water is not believed warranted by the possible damage to the road, which undoubtedly will prove less costly to repair than the interest upon the added investment.

The contractors for this road also are improving the West Henrietta road, No. 62, and have not sufficient plant to have completed both roads this season; it was, therefore, believed best to permit them to delay the construction of this road until next season, rather than have both roads in an uncompleted state at the end of the season. The standard depth of metalling, 4 inches of foundation and 2 inches of top will be laid, and limestone will be used.

HAMLIN ROAD, SECTION ONE, No. 80, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Casey & Murray, contractors.

Length, 4.637 miles; width of metalling, 16 feet.

| | |
|---|----------------|
| Plans approved by Board of Supervisors..... | March 26, 1901 |
| Contract dated | May 20, 1902 |
| Contract to be completed..... | Oct. 15, 1902 |
| Work begun | May 26, 1902 |
| Work completed September 30, 1902..... | 98% |
| Engineer's estimate of cost of work (revised).... | \$39,000 00 |
| Contract price | 37,000 00 |

E. V. R. Payne, assistant engineer, in charge.

This road extends from the northerly line of the incorporated village of Brockport, northerly through the unincorporated village of Clarkson to the northerly line of the town of Clarkson. A good macadam street in Brockport is a continuation of this road. Nearly all of the considerable traffic from the fruit growing country north passes over this road to Brockport. The soil

is a sandy loam, with short stretches of clay. The contractors began work promptly, but were delayed in putting stone on the road owing to the failure of their new stone-crushing plant to arrive, but have pushed their work with vigor. This section is now being completed, except cleaning up and some ditching.

The foundation course is 4 inches thick of crushed local sand-stone boulders, while the top course, 2 inches deep is composed of crushed granite hardheads. The foundation course is filled with sand, and the top course bound with the screenings produced in crushing the metalling.

HAMLIN ROAD, SECTION TWO, No. 81, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Casey & Murray, contractors.

Length, 4.057 miles; width of metalling, 16 feet.

| | |
|--|----------------|
| Plans approved by Board of Supervisors..... | March 26, 1901 |
| Contract dated | May 20, 1902 |
| Contract to be completed..... | Oct. 15, 1902 |
| Work begun | June 16, 1902 |
| Work completed September 30, 1902..... | 35% |
| Engineer's estimate of cost of work (revised)..... | \$33,500 00 |
| Contract price | 31,500 00 |

E. V. R. Payne, assistant engineer, in charge.

This road is a continuation of section 1, extending from the southerly line of the town of Hamlin through the unincorporated village of Hamlin to Sandy Creek, through a sandy loam country, and the main thoroughfare for the crops from the large fruit farms in this vicinity.

The metalling is the same as on Section 1, previously described.

Satisfactory progress is being made with this work, which, with suitable weather, it is expected will be completed during the present season.

BUFFALO ROAD, SECTION ONE, No. 82, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

George Chambers, contractor.

Length, 0.364 miles; width of metalling, 16 feet.

| | | |
|--|------|------------|
| Plans approved by Board of Supervisors..... | Mar. | 26, 1901 |
| Contract dated | May | 20, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work begun | May | 26, 1902 |
| Work completed | July | 22, 1902 |
| Engineer's estimate of cost of work (revised)... | | \$3,280 00 |
| Contract price | | 2,700 00 |

H. D. Alexander, assistant engineer, in charge.

This road extends from West avenue, Rochester, at the city line westerly to the crossing of the B. R. & P. Ry. tracks.

A single track electric railway with switches extends along the middle of this road. The plans contemplated the construction of a macadam roadway 8 feet in width on each side of the track, 2 feet outside of the rails. I persuaded the manager of the Rochester Railway Company to improve the intervening space, which was done by the contractor in the same manner as the contract with the State, and under our supervision, at the expense of the railway company, thus making the entire width of the metalling 25 feet. This arrangement undoubtedly will be better for both the tracks of the railway company, and for the improvement.

The entire road, 6 inches in depth, was built of local limestone quarried about two miles from Rochester on a farm adjoining the road; sand filler was used for foundation course.

BUFFALO ROAD, SECTION TWO, No. 83, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

George Chambers, contractor.

Length, 5.089 miles; width of metalling, 16 feet.

| | | |
|---|-------|----------|
| Plans approved by Board of Supervisors..... | March | 26, 1901 |
| Contract dated | May | 20, 1902 |
| Contract to be completed | Oct. | 15, 1902 |
| Work begun | May | 26, 1902 |
| Work completed, Sept. 30, 1902 | | 93% |

| | |
|---|-------------|
| Engineer's estimate of cost of work (revised) | \$42,000 00 |
| Contract price | 38,500 00 |

H. D. Alexander, assistant engineer, in charge.

This road is a continuation from section 1 at B. R. & P. Ry. tracks westerly to the west line of the town of Gates. The soil is a light loam. Local limestone was used throughout on this road, laid with a foundation course of 4 inches and a top course of 2 inches; sand filler was used in the foundation course. This work has progressed in a most satisfactory manner from the start, and its completion during this season is assured.

BIG TREE ROAD, No. 86, ERIE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Board of Supervisors of Erie county, contractors.

Mosier & Summers, sub-contractors.

Length, 4.004 miles; width of metalling, 16 feet.

| | |
|---|---------------|
| Plans approved by Board of Supervisors | May 2, 1901 |
| Contract dated | June 11, 1902 |
| Contract to be completed | Oct. 15, 1902 |
| Work begun | June 16, 1902 |
| Work completed Sept. 30, 1902 | 26% |
| Engineer's estimate of cost of work (revised) | \$42,500 00 |
| Contract price | 38,637 00 |

T. W. Barrally, assistant engineer, in charge.

This road extends from the incorporated village of East Aurora to and through the unincorporated village of Wales. The road is very hilly through a clayey and shale country. The steep grades have been reduced by cuts and fills, and in one locality a 20 per cent. grade, which could not be eliminated, except through heavy cuts and fills, has been remedied, and the grade reduced to 4 per cent. by a diversion line of 2,800 feet in length, but of little greater length than the old road. Local crushed boulders are being used for both courses, being sorted and the granite hardheads crushed, and used for the top 2 inches of the 6 inches depth of stone.

This work was promptly started after the making of the contract, and gave evidence of satisfactory progress, but of short life, nothing but grading was done for a considerable period, and even when the new crushing plant was erected and in operation, no improvement appeared, and the work has dragged on with little or no attention upon the part of the contractors, although constantly urged to make better progress.

It is evident at this time that not over half of the work will be completed during this season.

MAIN STREET ROAD, SECTION TWO, No. 87, ERIE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Board of Supervisors of Erie county, contractors.

Henry P. Burgard, sub-contractor.

Length, 1.926 miles; width of metalling, 16 feet.

| | |
|---|---------------|
| Plans approved by Board of Supervisors..... | May 2, 1901 |
| Contract dated | May 9, 1902 |
| Contract to be completed | Oct. 15, 1902 |
| Work begun | Aug. 11, 1902 |
| Work completed, Sept. 30, 1902 | 7% |
| Engineer's estimate of cost of work (revised).... | \$17,000 00 |
| Contract price | 15,100 00 |

T. W. Barrally, assistant engineer, in charge.

This road extends from the easterly line of the incorporated village of Williamsville easterly to the Transit road. This is a limestone region, the rock lying very close to the surface. The old road had considerable stone in it, which is being re-shaped and should make a splendid foundation. Limestone from the county house delivered by electric cars, which run on the northerly side of this road, is being used to make the 4-inch foundation and 2-inch top course.

Owing to the large amount of work, which this contractor has, and the favorable conditions for late season's work, an early start was not made, but it is hoped to complete this contract this season.

TRANSIT ROAD, SECTION ONE, No. 88, ERIE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Board of Supervisors of Erie County, contractors.

Henry P. Burgard, sub-contractor.

Length, 4.283 miles; width of metalling, 16 feet.

| | | |
|---|------|-------------|
| Plans approved by Board of Supervisors..... | May | 2, 1901 |
| Contract dated | May | 9, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work begun | June | 23, 1902 |
| Work completed, September 30, 1902..... | | 67% |
| Engineer's estimate of cost of work (revised).... | | \$39,500 00 |
| Contract price | | 35,400 00 |

T. W. Barrally, assistant engineer, in charge.

This road runs from Main Street road, northerly to the road to Clarence Center, about 3,000 feet northerly of the "Peanut Branch" of the N. Y. C. & H. R. R. R.

The soil runs from clay to sand. This road passes over the old lake escarpment down onto the flats drained by Tonawanda Creek. The slope of the land is so slight that the run off of this large watershed is slow, and the drainage of roads in this locality difficult, especially in the spring.

This road is built entirely of limestone mainly from a rock cut on the road itself, supplemented with stone brought in by rail from Akron, N. Y.

Work upon this road has been seriously delayed by the rainy weather, making it impossible to haul stone over either the sub-grade or along the sides, as is customary. Great trouble has been experienced with the rollers here, owing to the hard nature of the water, which was supplied from an artesian well of such quantity as to fill a 2½-inch pipe constantly.

It is hoped to lay all of the stone upon this road, although it is not expected that the work will be entirely finished this season.

TRANSIT ROAD, SECTION TWO, No. 89, ERIE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Board of Supervisors of Erie County, contractors.

Henry P. Burgard, sub-contractor.

Length, 4.062 miles; width of metalling, 16 feet.

| | | |
|---|-------|-------------|
| Plans approved by Board of Supervisors..... | May | 2, 1901 |
| Contract dated | May | 9, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work begun | Sept. | 6, 1902 |
| Work completed, September 30, 1902..... | | 2% |
| Engineer's estimate of cost of work (revised).... | | \$42,000 00 |
| Contract price | | 37,700 00 |

T. W. Barrally, assistant engineer, in charge.

This road extends from section 1, northerly to Tonawanda Creek, being very flat, poorly drained and in the spring and fall almost impassable. Owing to the difficult nature of this work, and the extraordinary wet season, it was deemed best to allow the contractor to exert his energies upon the three other roads for which he has the contracts, with the hope of finishing them this season, letting this work go over to next season, rather than endanger the completion of any. Limestone from Akron, N. Y., will be used.

MONROE AVENUE ROAD, No. 94, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Whitmore, Rauber & Vicinus, contractors.

Length, 4.226 miles; width of metalling, 14 and 16 feet.

| | | |
|---|------|-------------|
| Plans approved by Board of Supervisors..... | June | 10, 1901 |
| Contract dated | June | 9, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work begun | June | 23, 1902 |
| Work completed, September 30, 1902..... | | 79% |
| Engineer's estimate of cost of work (revised).... | | \$35,400 00 |
| Contract price | | 32,300 00 |

F. H. Crafts, leveler, in charge.

This road extends from the Rochester city line at Cobbs Hill to the boundaries of the incorporated village of Pittsford, a very much traveled thoroughfare, southeasterly from Rochester. The soil is loamy, with some clay. Along the northerly side of most of this road will be located the tracks of the Rochester and Eastern Rapid Railroad, laid under permit granted by the State Engineer and Surveyor, an adjustment of the lines of the improvement having been made to permit of same, payment for alterations being met by the railway company. The grades have been materially improved, especially over Cobbs Hill and the two bridges over the Erie canal. This road should be completed this season.

The easterly end has been open for traffic for upwards of a month, over 100 tons of brick, in loads of four and five tons together with a large agricultural traffic passing over it.

Crushed limestone boulders from the vicinity of Allen's Creek have been used for the metalling, with local screenings, supplemented with Leroy screenings.

WEBSTER ROAD, SECTION ONE, No. 98, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Horace N. Cowles, contractor.

Length, 1.576 miles; width of metalling, 14 and 16 feet.

| | |
|---|---------------|
| Plans approved by Board of Supervisors..... | July 9, 1901 |
| Contract dated | May 20, 1902 |
| Contract to be completed..... | Oct. 15, 1902 |
| Work begun | June 4, 1902 |
| Work completed, September 30, 1902..... | 83% |
| Engineer's estimate of cost of work (revised).... | \$19,600 00 |
| Contract price | 17,500 00 |

G. O. House and I. O. Cole, assistant engineers, in charge.

This road extends from Culver road and Clifford streets, Rochester (city line) easterly to Irondequoit Creek, passing from the highlands down to and across Irondequoit Bay. Every variety of soil has been encountered upon this road, and much difficult work completed. The grade down to Irondequoit Creek

has been improved from a grade varying from 8 to 20 per cent. to 7 per cent. by heavy cuts and fills. The early work was in this cut, but owing to bad weather, work had to be abandoned at this point for a time. Treacherous quicksand was encountered, but was overcome by a comprehensive system of under drainage. The progress now being made warrants the expectation of the completion of this contract this season.

Limestone from the Goodman Street Quarry, Rochester, was used throughout. The depth of the metalling being 6 inches except on the heavy grade, where it was increased to 7 inches.

The contractor for this road deserves credit, for his persistent efforts, without complaint, to meet the unforeseen difficulties encountered.

WEBSTER ROAD, SECTION TWO, No. 99, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

F. A. Brotsch, contractor.

Length, 2.960 miles; width of metalling, 14 and 16 feet.

| | | |
|---|------|-------------|
| Plans approved by Board of Supervisors..... | July | 9, 1901 |
| Contract dated | June | 3, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work begun | June | 16, 1902 |
| Work completed, September 30, 1902..... | | 82% |
| Engineer's estimate of cost of work (revised).... | | \$30,800 00 |
| Contract price | | 29,500 00 |

G. O. House and I. O. Cole, assistant engineers, in charge.

This road extends from Irondequoit Creek east, rising out of the Irondequoit Valley to the unincorporated village of West Webster, through a sandy country.

The heavy grade up from Irondequoit Bay has been reduced, equalized and in every way bettered.

Local limestone has been used entirely upon this road, progress upon which has at all times been satisfactory. The work should be completed this year.

The Rochester and Sodus Bay Railroad runs along the side of this road for about a mile,

WEBSTER ROAD, SECTION THREE, No. 100, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Harry L. Smith, contractor.

Length 3.398 miles; width of metalling, 16 feet.

| | | |
|---|------|-------------|
| Plans approved by Board of Supervisors..... | July | 9, 1901 |
| Contract dated | July | 1, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work begun | Aug. | 14, 1902 |
| Work completed September 30, 1902..... | | 21¢ |
| Engineer's estimate of cost of work (revised).... | | \$28,241 66 |
| Contract price | | 25,000 00 |

I. O. Cole, assistant engineer, in charge.

This road extends from West Webster to Webster along a sandy ridge, a fair road in damp, but difficult for traffic, in dry weather. Considerable delay ensued in the starting of this work, losing valuable time, with the result that the probability of its completion this year is remote. Crushed local sandstone boulders are being used for the 4-inch foundation course and crushed granite boulders for the top course of 2 inches, a sand filler being used in the foundation course and the screenings produced, being used to build the top course. The Rochester and Sodus Bay Railroad runs along the southerly side of this road, except through the Village of Webster, where it occupies the middle of the highway. I have about concluded arrangements for the railway company to macadamize between and for 2 feet outside of their tracks at their expense.

WEBSTER ROAD, SECTION FOUR, No. 101, MONROE COUNTY, N. Y.

Chapter 115, Laws of 1898.

Harry L. Smith, contractor.

Length, 2.879 miles; width of metalling, 16 feet.

| | | |
|---|------|-------------|
| Plans approved by Board of Supervisors..... | July | 9, 1901 |
| Contract dated | July | 1, 1902 |
| Contract to be completed..... | Oct. | 15, 1902 |
| Work not started | Oct. | 1, 1902 |
| Engineer's estimate of cost of work (revised).... | | \$24,902 95 |
| Contract price | | 20,000 00 |

This road runs in a similar manner to section 1 along a sandy ridge from Webster to the east line of Monroe County, at Union Hill. The contractor has done no work upon this road as yet, and present conditions do not indicate his ability to get his other work done so as to begin this, his plant being inadequate to work on both roads at once. Local stone will be used. It is hoped to make an arrangement with the Rochester and Sodus Bay Railway to improve the road between and outside of their tracks for 2 feet where they occupy the middle of the highway through Webster and Union Hill, as mentioned above, on section 3, of this road.

RECAPITULATION OF WORK DONE TO SEPTEMBER 30, 1902.

| COUNTY. | Miles under contract during year ending September 30, 1902. | Miles of plans and estimates completed prior to September 30, 1901. | Miles of plans and estimates completed prior to September 30, 1902. | Miles of plans and estimates completed during year ending September 30, 1902. | Miles of surveys made during year ending September 30, 1902. | Miles of contracts completed prior to September 30, 1901. | Miles of contracts completed prior to September 30, 1902. | Miles of contracts completed during year ending September 30, 1902. |
|------------------|---|---|---|---|--|---|---|---|
| Chemung... | 5.489 | 8.089 | 8.089 | ..... | 4.512 | 2.600 | 8.089 | 5.489 |
| Erie..... | 23.222 | 53.169 | 53.169 | ..... | 5.981 | 9.153 | 9.153 | ..... |
| Livingston ..... | ..... | 18.162 | 31.326 | 13.164 | ..... | ..... | ..... | ..... |
| Monroe..... | 53.180 | 64.548 | 105.971 | 41.423 | 19.058 | 9.617 | 14.324 | 4.707 |
| Niagara..... | ..... | ..... | 3.147 | 3.147 | 3.147 | ..... | ..... | ..... |
| Ontario..... | ..... | ..... | 35.492 | 35.492 | 38.545 | ..... | ..... | ..... |
| Yates..... | ..... | ..... | ..... | ..... | 3.691 | ..... | ..... | ..... |
| Total..... | 81.891 | 143.968 | 237.194 | *93.226 | 74.934 | 21.370 | 31.566 | †10.196 |

*All survey-notes taken have been plotted.

†About 45 miles of road have been built on uncompleted contracts, and are not included above.

It gives me pleasure to express my thanks to you, and your deputy, Mr. Wm. Pierson Judson, for courtesy and assistance in the discharge of the duties of my office, and to Resident Engineer M. W. Wilbur, and the subordinate members of my force for their consistent and faithful attention to the business of this department, and their good fellowship, and consideration of each other.

Very respectfully submitted,

A. J. ROCKWOOD,

Division Engineer.

IMPROVEMENT OF PUBLIC HIGHWAYS, WESTERN DIVISION, TO SEPTEMBER 30, 1902.

| Petition number. | Road number. | NAME OF ROAD. | *Miles petitioned for. | Miles surveyed. | Miles mapped. | Miles accepted by county. | Miles under contract. | Miles and accepted. | Remarks. |
|-------------------------|--------------|--------------------------------|------------------------|-----------------|---------------|---------------------------|-----------------------|---------------------|--|
| <i>Chemung County.</i> | | | | | | | | | |
| 226 | 13 | North Chemung..... | 6.000 | 2.60 | 2.60 | 2.60 | 2.60 | 2.60 | Examined, and not deemed of sufficient importance. |
| 52 | 13 | Southport, section 1..... | 3.408 | 3.408 | 3.408 | 3.408 | 3.408 | 3.408 | |
| 52 | 28 | Southport, section 2..... | 1.060 | 1.060 | 1.060 | 1.060 | 1.060 | 1.060 | |
| 52 | 29 | Southport, section 3..... | 1.021 | 1.021 | 1.021 | 1.021 | 1.021 | 1.021 | |
| 53 | 30 | South Broadway..... | 4.512 | 4.512 | | | | | |
| 225 | | Wellsburg..... | 18.601 | 12.602 | 8.089 | 8.089 | 8.089 | 8.089 | Plans delayed at request of Supervisors. |
| <i>Chemung County.</i> | | | | | | | | | |
| 202 | 128 | Aurora-Buffalo, section 1..... | 7.50 | 5.573 | 5.573 | 5.573 | | | Parallel and adjacent to two roads now improved. |
| 248 | | Aurora-Buffalo, section 2..... | 4.227 | 4.227 | | | | | Plans in progress. |
| 334 | | Aurora-Buffalo, section 3..... | 0.754 | 0.754 | | | | | Plans in progress. |
| 4 | | Base Line, section 1..... | 1.809 | 1.809 | | | | | Examined, and not deemed of sufficient importance. |
| 4 | | Base Line, section 2..... | 2.588 | 2.588 | | | | | Examined, and not deemed of sufficient importance. |
| 4 | | Base Line, section 3..... | 1.943 | 1.943 | | | | | |
| 5 | 86 | Big Tree..... | 4.004 | 4.004 | 4.004 | 4.004 | 4.004 | 4.004 | |
| 6 | 69 | Main street, section 1..... | 3.415 | 3.415 | 3.415 | 3.415 | 3.415 | 3.415 | |
| 6 | 87 | Main street, section 2..... | 1.926 | 1.926 | 1.926 | 1.926 | 1.926 | 1.926 | |
| 6 | 130 | Main street, section 3..... | 5.625 | 5.625 | 5.625 | 5.625 | | | |
| 6 | 131 | Main street, section 4..... | 6.581 | 6.581 | 6.581 | 6.581 | | | |
| 112 | 27 | Orchard Park, section 1..... | 1.155 | 1.155 | 1.155 | 1.155 | 1.155 | 1.155 | |
| 112 | 66 | Orchard Park, section 2..... | 0.952 | 0.952 | 0.952 | 0.952 | 0.952 | 0.952 | |
| 112 | 67 | Orchard Park, section 3..... | 3.410 | 3.410 | 3.410 | 3.410 | 3.410 | 3.410 | |
| 112 | 68 | Orchard Park, section 4..... | 1.170 | 1.170 | 1.170 | 1.170 | 1.170 | 1.170 | |
| 249 | | Orchard Park, section 5..... | 1.2 | 1.2 | | | | | |
| 59 | 23 | River, section 1..... | 1.458 | 1.458 | 1.458 | 1.458 | 1.458 | 1.458 | Plans in progress. |
| 224 | 129 | River, sections 2 and 3..... | 3.015 | 3.015 | 3.015 | 3.015 | | | |
| 128 | 88 | Transit, section 1..... | 4.283 | 4.283 | 4.283 | 4.283 | 4.283 | 4.283 | |
| 128 | 89 | Transit, section 2..... | 4.062 | 4.062 | 4.062 | 4.062 | 4.062 | 4.062 | |
| 1 | 2-2a | White's Corners..... | 6.540 | 6.540 | 6.540 | 6.540 | 6.540 | 6.540 | |
| Total, Erie County..... | | | 73.190 | 65.690 | 53.169 | 53.169 | 32.375 | 9.153 | |

| | | Livingston County. | | | | Monroe County. | | | | | |
|-----|--------------------------------------|--------------------|--------|--|--|----------------|-------|-------|-------|--|--|
| 125 | Avon-Caledonia..... | 5,804 | 5,804 | | | 2,50 | 3,746 | | | | |
| 122 | Dansville-Mt. Morris, section 1..... | 5,373 | 5,373 | | | 0,364 | 0,364 | 0,364 | 0,364 | | |
| 122 | Dansville-Mt. Morris, section 2..... | 4,899 | 4,899 | | | 5,089 | 5,089 | 5,089 | 5,089 | | |
| 122 | Dansville-Mt. Morris, section 3..... | 3,068 | 3,068 | | | 3,623 | 3,623 | 3,623 | 3,623 | | |
| 311 | Dansville-Geneseo..... | 10.00 | | | | 0,917 | 2,917 | 2,917 | | | |
| 124 | Geneseo-Avon, section 1..... | 3,728 | 3,728 | | | 3,107 | 3,107 | | | | |
| 124 | Geneseo-Avon, section 2..... | 3,257 | 3,257 | | | 2,556 | 2,556 | | | | |
| 123 | Mt. Morris-Geneseo..... | 5,197 | 5,197 | | | 0,994 | 0,994 | | | | |
| | Total, Livingston County..... | 41,326 | 31,326 | | | 0,757 | 0,757 | | | | |
| 192 | Allen's Creek..... | | | | | 3,30 | 3,30 | 3,30 | 3,30 | | |
| 163 | Barard's Crossing..... | | | | | 4,019 | 4,019 | 4,019 | 4,019 | | |
| 84 | Buffalo, section 1..... | | | | | 2,880 | 2,880 | 2,880 | 2,880 | | |
| 83 | Buffalo, section 2..... | | | | | 2,450 | 2,450 | 2,450 | 2,450 | | |
| 34 | Clifton, section 1..... | | | | | 5,00 | 3,039 | 3,039 | 3,039 | | |
| 78 | Clifton, section 2..... | | | | | 8,50 | 4,637 | 4,637 | 4,637 | | |
| 138 | Clinton Avenue..... | | | | | 4,057 | 4,057 | 4,057 | 4,057 | | |
| 179 | Chili, section 1..... | | | | | 4,30 | 4,30 | 4,30 | 4,30 | | |
| 196 | Chili, section 2..... | | | | | 0,637 | 0,637 | 0,637 | 0,637 | | |
| 211 | Chili, section 3..... | | | | | 0,995 | 0,995 | 0,995 | 0,995 | | |
| 44 | Despatch, section 1..... | | | | | 2,00 | 2,00 | 2,00 | 2,00 | | |
| 144 | Despatch, section 2..... | | | | | 6,835 | 6,835 | 6,835 | 6,835 | | |
| 137 | Dugway, section 1..... | | | | | 2,062 | 2,062 | 2,062 | 2,062 | | |
| 137 | Dugway, section 2..... | | | | | 3,608 | 3,608 | 3,608 | 3,608 | | |
| 137 | Dugway, section 3..... | | | | | 3,360 | 3,360 | 3,360 | 3,360 | | |
| 37 | Dugway, section 4..... | | | | | 3,00 | | | | | |
| 33 | East Avenue..... | | | | | | | | | | |
| 197 | East Henrietta..... | | | | | | | | | | |
| 43 | Fairport..... | | | | | | | | | | |
| 36 | Five Mile Lake..... | | | | | | | | | | |
| 212 | Hamlin, section 1..... | | | | | | | | | | |
| 39 | Hamlin, section 2..... | | | | | | | | | | |
| 81 | Hilton..... | | | | | | | | | | |
| 162 | Hudson Avenue, section 1..... | | | | | | | | | | |
| 41 | Hudson Avenue, section 2..... | | | | | | | | | | |
| 178 | Lake, section 1..... | | | | | | | | | | |
| 171 | Lake, section 2..... | | | | | | | | | | |
| 294 | Lake, section 3..... | | | | | | | | | | |
| 324 | Latta..... | | | | | | | | | | |
| 40 | Little Ridge, section 1..... | | | | | | | | | | |
| 162 | Little Ridge, section 2..... | | | | | | | | | | |
| 165 | Little Ridge, section 3..... | | | | | | | | | | |
| 215 | Little Ridge, section 4..... | | | | | | | | | | |
| 214 | Long Pond..... | | | | | | | | | | |
| 299 | | | | | | | | | | | |

*Approximate, where survey has not been made.

IMPROVEMENT OF PUBLIC HIGHWAYS, WESTERN DIVISION, TO SEPTEMBER 30, 1902 — (Concluded).

| Petition number. | Road number. | NAME OF ROAD. | *Miles petitioned for. | Miles surveyed. | Miles mapped. | Miles accepted by county. | Miles under construction. | Miles completed and accepted. | Remarks. |
|-------------------------------------|--------------|-------------------------------------|------------------------|-----------------|---------------|---------------------------|---------------------------|-------------------------------|--|
| Monroe County — (Concluded). | | | | | | | | | |
| 195 | | Lyell Avenue..... | 2.121 | 2.121 | 2.121 | 4.226 | 4.226 | | |
| 32 | 94 | Monroe Avenue..... | 4.226 | 4.226 | 4.226 | 3.635 | | | |
| 35 | 160 | Penfield, section 1..... | 3.635 | 3.635 | 3.635 | 5.313 | | | |
| 35 | 167 | Penfield, section 2..... | 5.313 | 5.313 | 5.313 | 1.304 | 1.304 | | |
| 129 | 61 | Pittsford..... | 1.304 | 1.304 | 1.304 | 0.703 | | | |
| 158 | 172 | Portland Avenue, section 1..... | 0.703 | 0.703 | 0.703 | | | | |
| 177 | | Portland Avenue, section 2..... | 0.50 | 0.50 | | | | | |
| 121 | | Paul..... | 3.00 | | | | | | |
| 175 | | Ridge..... | 3.00 | | | | | | |
| 210 | | Redman..... | 2.455 | 2.445 | 2.455 | | | | |
| 216 | | Rich's Dugway..... | | | | | | | |
| 46 | 63 | Scottsville, section 1..... | 2.254 | 2.254 | 2.254 | 2.254 | 2.254 | | |
| 46 | 79 | Scottsville, section 2..... | 7.537 | 7.537 | 7.537 | 1.576 | 1.576 | | |
| 42 | 98 | Webster, section 1..... | 1.576 | 1.576 | 1.576 | 2.960 | 2.960 | | |
| 42 | 99 | Webster, section 2..... | 2.960 | 2.960 | 2.960 | 3.398 | 3.398 | | |
| 42 | 100 | Webster, section 3..... | 3.398 | 3.398 | 3.398 | 2.879 | 2.879 | | |
| 42 | 101 | Webster, section 4..... | 2.879 | 2.879 | 2.879 | 6.237 | 6.237 | | |
| 45 | 62 | West Henrietta..... | 6.237 | 6.237 | 6.237 | | | | |
| 333 | | Left-Fork-German-Church-Redman..... | 5.552 | 5.552 | | | | | |
| | | Total, Monroe County..... | 163.862 | 130.512 | 105.971 | 87.704 | 62.797 | 14.324 | |
| Niagara County. | | | | | | | | | |
| 306 | | Griwold Street..... | 3.147 | 3.147 | 3.147 | | | | Ready for submission to fall meeting of Supervisors. |
| | | Total, Niagara County..... | 3.147 | 3.147 | 3.147 | | | | |

Plans in progress.
Petition covered by Clifton road, section 1, No. 78.
To be surveyed in part in the near future.
Examined and not deemed of sufficient importance.
Deferred until after the construction of Dugway road, section 1, No. 168.

Plans in progress.

Plans deferred until completion of section 1.

| | | | | | |
|------------------------|-----|----------------------------------|--------|--------|-----------------|
| 90 | 146 | Geneva-Canandaigua, section 1... | 5,624 | 5,624 | Ontario County. |
| 227 | 188 | Bristol Valley, section 1... | 4,830 | 4,830 | |
| 228 | 191 | Honeye-Hemlock. | 4,549 | 4,549 | |
| 301 | 187 | Bristol... | 1,720 | 1,720 | |
| 328 | 203 | Gorham-Stanley. | 2,197 | 2,197 | |
| 329 | 206 | Reed's Corners. | 2,669 | 2,669 | |
| 330 | 207 | Geneva-Canandaigua, section 2. | 6,213 | 6,213 | |
| 331 | 190 | East Side Lake, section 1... | 2,368 | 2,368 | |
| 335 | 204 | Naples-Atlanta. | 0,585 | 0,585 | |
| 336 | 189 | East Side Lake, section 2. | 1,286 | 1,286 | |
| 337 | 205 | Naples-Woodville. | 3,451 | 3,451 | |
| 227 | ... | Bristol Valley, section 2. | 6,679 | 6,679 | |
| 227 | ... | Bristol Valley, section 5. | 1,998 | 1,998 | |
| Total, Ontario County. | | | 44,169 | 44,169 | |
| | | | 35,492 | 35,492 | |

Not wanted by Supervisors.

| | | | |
|----|----------------------------|------|-----------------|
| 62 | Seth Ransome..... | 2.25 | Orleans County. |
| | Total, Orleans County..... | 2.25 | |

| | | | | |
|-----|------------------------------|---------|---------|---------|
| 365 | Kinney's Corners..... | 3,691 | 3,691 | |
| | Total, Yates County..... | 3,691 | 3,691 | |
| | Total, Western Division..... | 350,236 | 291,137 | 237,194 |
| | | | | 184,454 |
| | | | | 103,261 |
| | | | | 31,566 |

*Approximate, where survey has not been made.

ENGINEERING EXPENSES ON HIGHWAY IMPROVEMENTS, WESTERN DIVISION, TO OCTOBER 1, 1902.

(Under chapter 115, Laws of 1898.)

| HIGHWAY IMPROVEMENTS. | County. | Length,
miles. | ENGINEERING EXPENSES. | | | |
|--|----------|-------------------|-----------------------|----------|---------------|--------------------------------|
| | | | Survey. | Plans. | Construction. | Inspection for
maintenance. |
| Whites' Corners road No. 2 and 2A. | Erie. | 6.54 | \$811 25 | ..... | \$5 222 27 | \$154 47 |
| East avenue road No. 5. | Monroe. | 2.45 | 6574 88 | ..... | 2 201 98 | 80 14 |
| Little Ridge road No. 6. | Monroe. | 6.53 | 6068 65 | \$200 00 | 2 484 76 | 69 83 |
| River road No. 23. | Erie. | 1.458 | 4327 99 | 64 00 | 412 48 | 34 33 |
| Southport road, section 1, No. 13. | Chemung. | 2.60 | 4571 10 | 161 37 | 1 250 14 | 15 28 |
| Monroe avenue, road No. 94. | Monroe. | 4.226 | 7520 37 | 307 24 | 1 696 79 | ..... |
| Orchard Park road, section 1, No. 27. | Erie. | 1.132 | 42 42 | 45 62 | 1 344 10 | 6 00 |
| Southport road, section 2, No. 15. | Monroe. | 1.155 | 90 81 | 57 25 | 439 47 | 38 64 |
| Hudson avenue road No. 28. | Chemung. | 3.408 | 396 19 | 253 00 | 2 553 10 | 17 59 |
| Southport road, section 3, No. 29. | Chemung. | 1.06 | 319 67 | 21 50 | 499 87 | ..... |
| South Broadway road No. 30. | Chemung. | 1.021 | 278 31 | 50 00 | 548 28 | ..... |
| Little Ridge road, section 2, Pet. No. 162. | Monroe. | 2.062 | 102 85 | 185 79 | ..... | ..... |
| Little Ridge road, section 3, Pet. No. 215. | Monroe. | 3.608 | 158 72 | 138 58 | ..... | ..... |
| Little Ridge road, section 4, Pet. No. 214. | Monroe. | 3.36 | 164 31 | 198 50 | ..... | ..... |
| Orchard Park road, section 2, No. 66. | Erie. | .952 | 134 88 | 61 96 | 664 33 | ..... |
| Orchard Park road, section 3, No. 67. | Erie. | 3.41 | 394 87 | 168 10 | 12 85 | ..... |
| Orchard Park road, section 4, No. 68. | Erie. | 1.17 | 135 46 | 54 39 | ..... | ..... |
| Pittsford road No. 61. | Monroe. | 1.304 | 116 47 | 136 75 | 1 330 08 | ..... |
| River road, sections 2 and 3, No. 129. | Erie. | 3.015 | 245 57 | 23 42 | ..... | ..... |
| Hudson avenue road, section No. 2, Pet. 178. | Monroe. | .995 | 50 61 | 92 28 | ..... | ..... |
| Fairport road No. 60. | Monroe. | 3.039 | 379 81 | 251 14 | 2 303 82 | 3 35 |
| Aurora-Buffalo road, Pet. No. 202. | Erie. | 5.573 | 376 88 | 271 34 | ..... | ..... |
| Big Tree road No. 50. | Erie. | 4.004 | 565 69 | 238 99 | 1 183 89 | ..... |
| West Henrietta road No. 62. | Monroe. | 6.237 | 497 31 | 307 64 | 1 096 00 | ..... |
| Main street road, section 1, No. 69. | Erie. | 3.415 | 324 19 | 63 13 | 1 382 10 | ..... |
| Main street road, section 2, No. 87. | Erie. | 1.924 | 183 89 | 78 49 | 120 17 | ..... |
| Main street road, section 3, No. 130. | Erie. | 5.025 | 535 30 | 254 97 | ..... | ..... |
| Main street road, section 4, No. 131. | Erie. | 6.681 | 578 47 | 353 48 | ..... | ..... |
| Base Line road, Pet. No. 4. | Erie. | 6.33 | 694 45 | 34 60 | ..... | ..... |
| Buffalo road, section 1, No. 82. | Monroe. | .364 | 20 84 | 17 81 | \$503 35 | ..... |
| Buffalo road, section 2, No. 83. | Monroe. | 6.089 | 305 87 | 251 67 | 1 661 81 | ..... |
| Wellsville road, Pet. No. 225. | Chemung. | 4.512 | 334 25 | 67 24 | ..... | ..... |
| Scottsville road, section 1, No. 63. | Monroe. | 2.254 | 108 33 | 60 14 | 658 84 | ..... |
| Scottsville road, section 2, No. 79. | Monroe. | 7.537 | 447 91 | 430 80 | 94 73 | ..... |

| | | | | | |
|---|-----------------|-------|----------|--------|----------|
| Clifton road, section 1, No. 78..... | Monroe..... | 3.623 | 159.45 | 164.80 | 7.86 |
| Clifton road, section 2, No. 38..... | Monroe..... | 2.925 | 227.69 | 172.00 | |
| Transit road, section 1, No. 88..... | Erie..... | 3.524 | 336.41 | 177.99 | 914.78 |
| Transit road, section 2, No. 89..... | Erie..... | 4.062 | 336.75 | 148.97 | 45.06 |
| Despatch road, section 1, Pet. No. 44..... | Monroe..... | .994 | 57.72 | 47.70 | |
| Despatch road, section 2, Pet. No. 44..... | Monroe..... | .757 | 44.04 | 34.55 | |
| Webster road, section 1, No. 98..... | Monroe..... | 1.576 | 99.60 | 126.00 | 878.33 |
| Webster road, section 2, No. 98..... | Monroe..... | 2.96 | 206.04 | 244.92 | 505.94 |
| Webster road, section 3, No. 100..... | Monroe..... | 3.398 | 207.75 | 253.31 | 481.23 |
| Webster road, section 4, No. 101..... | Monroe..... | 2.879 | 187.08 | 200.92 | |
| Hamlin road, section 1, No. 81..... | Monroe..... | 4.637 | 200.22 | 211.33 | 1,175.53 |
| Hamlin road, section 2, No. 81..... | Monroe..... | 4.057 | 176.09 | 175.67 | 669.59 |
| Chili road, section 1, Pet. No. 196..... | Monroe..... | 3.017 | 128.80 | 110.50 | |
| Chili road, section 2, Pet. No. 211..... | Monroe..... | 2.556 | 91.40 | 126.55 | |
| Geneva-Canandaigua road, section 1, No. 146..... | Monroe..... | 5.624 | 567.54 | 332.03 | |
| Geneva-Canandaigua road, section 2, Pet. No. 330..... | Ontario..... | 6.213 | 243.75 | 93.44 | |
| Lake road, Pet. No. 171..... | Monroe..... | 2.000 | 87.12 | 142.53 | |
| Port land avenue road, Pet. No. 158..... | Monroe..... | .703 | 72.20 | 60.77 | |
| Danville & Mt. Morris road, Pet. No. 122..... | Livingston..... | 13.34 | 1,221.08 | 777.42 | |
| Mt. Morris-Genesee road, Pet. No. 122..... | Livingston..... | 5.197 | 255.54 | 175.10 | |
| Genesee-Avon road, Pet. No. 124..... | Livingston..... | 6.985 | 412.36 | 360.40 | |
| Avon-Caledonia road, Pet. No. 125..... | Livingston..... | 5.804 | 502.67 | 202.00 | |
| Lyell road, Pet. No. 195..... | Monroe..... | 2.121 | 147.11 | 129.35 | |
| Rich's Dugway road, Pet. No. 216..... | Monroe..... | 2.455 | 222.35 | 164.00 | |
| Hilton road, Pet. No. 301..... | Monroe..... | 4.30 | 127.59 | 155.75 | |
| Griswald street road, Pet. No. 102..... | Niagara..... | 3.147 | 153.49 | 130.63 | |
| Honeoye-Hemlock road, Pet. No. 228..... | Ontario..... | 1.720 | 166.83 | 119.85 | |
| Bristol road, Pet. No. 306..... | Ontario..... | 4.549 | 345.16 | 172.75 | |
| Aurora-Buffalo road, section 2, Pet. No. 248..... | Ontario..... | 5.717 | 596.15 | 243.17 | |
| Bristol Valley road, Pet. No. 227..... | Erie..... | 4.227 | 196.96 | | |
| Reeds' Corners road, Pet. No. 329..... | Ontario..... | 2.234 | 142.91 | 86.83 | |
| East Side Lake road, section 1, Pet. No. 331..... | Ontario..... | 2.368 | 122.76 | 83.84 | |
| East Side Lake road, section 2, Pet. No. 336..... | Ontario..... | 1.286 | 100.00 | 84.25 | |
| Narves-Woodville road, Pet. No. 337..... | Ontario..... | 3.508 | 173.15 | 129.72 | |
| Narves-Atlanta road, Pet. No. 335..... | Ontario..... | .585 | 21.50 | 46.15 | |
| Gorham-Stanley road, Pet. No. 328..... | Ontario..... | 2.197 | 127.62 | 79.75 | |
| Aurora-Buffalo road, section 2, Pet. No. 334..... | Erie..... | .754 | 42.00 | | |
| Orchard Park road, section 5, Pet. No. 249..... | Erie..... | 1.000 | 73.13 | | |
| Left Fork-German Church, Redman road, Pet. No. 333..... | Monroe..... | 5.552 | 144.37 | | |
| Barnard's Crossing road, Pet. No. 163..... | Monroe..... | 3.746 | 125.91 | | |

Of this \$857.58, Survey and Plans, and \$1,138.42 construction. Previous administration.

Of this \$518.21, Survey and Plans. Previous administration.

Of this \$827.30, Survey and Plans. Previous administration.

Of this \$127.89, Survey and Plans. Previous administration.

Of this \$671.10, Survey and Plans. Previous administration.

Of this \$267.77, Survey and Plans, previous administration.

ENGINEERING EXPENSES ON HIGHWAY IMPROVEMENTS, WESTERN DIVISION, TO OCTOBER 1, 1902 — (Concluded).

| HIGHWAY IMPROVEMENTS. | County. | Length,
miles. | ENGINEERING EXPENSES. | | | |
|--------------------------------------|---------|-------------------|-----------------------|--------|---------------|--------------------------------|
| | | | Survey. | Plan. | Construction. | Inspection for
maintenance. |
| Latta road, Pet. No. 334. | Monroe. | 6.835 | \$207 50 | \$2 00 | ..... | ..... |
| Lake road, section 2, Pet. No. 94. | Monroe. | 3.000 | ..... | 202 47 | ..... | ..... |
| Penfield road, section 1, No. 166. | Monroe. | 3.635 | 239 83 | 295 91 | ..... | ..... |
| Penfield road, section 2, No. 167. | Monroe. | 5.313 | 350 84 | 214 13 | ..... | ..... |
| Dugway road, section 1, No. 168. | Monroe. | 3.30 | 390 97 | 260 67 | ..... | ..... |
| Dugway road, section 2, No. 169. | Monroe. | 4.019 | 476 29 | 186 79 | ..... | ..... |
| Dugway road, section 3, No. 170. | Monroe. | 2.880 | 341 80 | ..... | ..... | ..... |
| Kinney's Corners road, Pet. No. 365. | Yates. | 3.691 | 60 00 | ..... | ..... | ..... |

TABLE OF CONTRACTS TERMINATED, WESTERN DIVISION, ERIE CANAL, DURING THE YEAR ENDING
SEPTEMBER 30, 1902.

| CONTRACTORS. | Contract signed. | Date of final estimate. | Character of work. | LEGISLATIVE ACT. | | Appropriation. | Engineer's estimate. | Contract price. | Final estimate. |
|------------------------------|------------------|-------------------------|---|------------------|-------|----------------|----------------------|-----------------|-----------------|
| | | | | Chap. | Laws. | | | | |
| Havana Bridge Works. | April 24, 1900 | Oct. 31, 1901 | Chapel street bridge, Lockport. | 573 | 1899 | \$24,000 00 | \$14,909 60 | \$18,915 00 | \$19,621 67 |
| Niagara Construction Co. | Nov. 27, 1900 | Feb. 28, 1902 | Pine & Lock street bridge, Lockport. | 16 | 1900 | 75,000 00 | 64,743 00 | 51,769 80 | 51,758 33 |
| Havana Bridge Works | Oct. 19, 1900 | Aug. 22, 1902 | West avenue bridge, Rochester. | 430 | 1900 | 75,000 00 | 67,294 00 | 68,528 70 | 67,838 57 |
| American Bridge Co. | July 20, 1901 | July 30, 1902 | Lyell avenue foot bridge, Rochester. | 549 | 1899 | 3,000 00 | 2,704 00 | 2,427 50 | 2,413 09 |
| Henry Beardsley | Oct. 19, 1900 | Dec. 5, 1901 | Corning dyke, Steuben county. | 645 | 1901 | 4,300 00 | 3,379 60 | 3,198 79 | 2,703 00 |
| Crahan & Kearns. | Oct. 9, 1901 | April 10, 1902 | Vertical wall, Eagle Harbor, N. Y. | 441 | 1900 | 4,000 00 | 3,938 75 | 3,008 75 | 3,059 67 |
| King Bridge Co. | Mar. 1, 1901 | Sept. 23, 1901 | Vernon st. bridge, Middleport, No. 144. | 686 | 1901 | 2,714 40 | 3,127 50 | 2,780 00 | 2,714 40 |
| King Bridge Co. | Mar. 1, 1901 | Sept. 23, 1901 | Bridge No. 183—2½ miles West of Tonawanda. | 311 | 1900 | 1,764 28 | 1,980 00 | 1,760 00 | 1,764 28 |
| Marson & Ryan. | Oct. 9, 1901 | Aug. 1, 1902 | Glen creek improvement. | 699 | 1901 | 6,057 83 | 5,736 60 | 4,913 00 | 4,875 24 |
| <i>Highway Improvements.</i> | | | | | | | | | |
| Chambers & Casey. | July 15, 1901 | June 5, 1902 | Fairport road No. 60, Monroe Co. | 115 | 1898 | | 32,539 87 | 32,400 00 | 32,400 00 |
| Whitmore, Rauber & Vicinus. | July 15, 1901 | Nov. 26, 1901 | Pittsford road, No. 61, Monroe Co. | | 1899 | | 13,302 64 | 13,200 00 | 13,200 00 |
| Swan & Murray. | July 17, 1901 | June 5, 1902 | Southport road, section 2, No. 28. | | 1900 | | 36,516 55 | 33,108 00 | 33,208 00 |
| Costello & Neagle. | July 17, 1901 | May 6, 1902 | Chemung Co., Southport road, section 3, No. 29. | | 1900 | | 10,447 81 | 10,634 00 | 11,022 50 |
| Costello & Neagle. | July 17, 1901 | May 6, 1902 | Chemung Co., South Broadway road, No. 30, Chemung Co. | | 1901 | | 10,100 00 | 9,167 00 | 9,867 00 |
| George Chambers. | May 20, 1902 | Aug. 1, 1902 | Buffalo road, section 1, No. 82. | 384 | 1902 | | 3,280 00 | 2,700 00 | 2,700 00 |
| | | | Monroe Co. | | | | | | |

TABLE OF CONTRACTS PENDING, WESTERN DIVISION, ERIE CANAL, SEPTEMBER 30, 1902.

| CONTRACTORS. | Contract signed. | Character of work. | LEGISLATIVE ACT. | | Appropriations. | Engineer's estimate. | Contract price. | Estimated to date. |
|---------------------------------------|------------------|---|------------------|-------|-----------------|----------------------|-----------------|--------------------|
| | | | Chap. | Laws. | | | | |
| Owego Bridge Co. | Oct. 29, 1901 | Cattaraugus Creek Bridge. | 685 | 1901 | \$17,000 00 | \$16,882 50 | \$14,574 00 | \$10,548 00 |
| Owego Bridge Co. | April 24, 1902 | Plymouth avenue bridge, Rochester. | 732 | 1901 | 50,000 00 | 48,415 00 | 43,320 00 | ..... |
| Owego Bridge Co. | April 24, 1902 | Ferry street bridge, Buffalo. | 618 | 1899 | 30,000 00 | 28,307 00 | 26,860 50 | ..... |
| Wm. H. Schmidt. | Sept. 18, 1902 | Onoville bridge. | 696 | 1901 | 29,000 00 | 28,454 00 | 25,311 50 | ..... |
| | | | 467 | 1902 | | | | |
| <i>Highway Improvements.</i> | | | | | | | | |
| Board of Supervisors of Erie Co. May | 9, 1902 | Main street road, section 1, No. 69, Erie Co. | | | | 28,000 00 | 25,000 00 | 17,812 50 |
| Board of Supervisors of Erie Co. May | 9, 1902 | Main street road, section 2, No. 87, Erie Co. | | | | 17,000 00 | 15,100 00 | 792 75 |
| Casey & Murray. | May 20, 1902 | Hamlin road, section 1, No. 80, Monroe Co. | | | | 39,000 00 | 37,000 00 | 27,195 00 |
| Casey & Murray. | May 20, 1902 | Hamlin road, section 2, No. 81, Monroe Co. | | | | 33,500 00 | 31,500 00 | 8,268 75 |
| George Chambers. | May 20, 1902 | Buffalo road, section 3, No. 83, Monroe Co. | | | | 42,000 00 | 38,500 00 | 26,853 75 |
| Board of Supervisors of Erie Co. May | 9, 1902 | Transit road, section 1, No. 88, Erie Co. | | | | 39,500 00 | 35,400 00 | 17,788 50 |
| Board of Supervisors of Erie Co. May | 9, 1902 | Transit road, section 2, No. 89, Erie Co. | | | | 42,000 00 | 37,700 00 | 565 50 |
| H. N. Cowles. | June 3, 1902 | Webster road, section 1, No. 98, Monroe Co. | 115 | 1898 | | 19,600 00 | 17,500 00 | 10,893 75 |
| Fred Brotsch. | June 3, 1902 | Webster road, section 2, No. 99, Monroe Co. | 569 | 1899 | | 30,800 00 | 29,500 00 | 18,142 50 |
| Harry L. Smith. | July 1, 1902 | Webster road, section 3, No. 100, Monroe Co. | 419 | 1900 | | 32,400 00 | 25,000 00 | 3,937 50 |
| Harry L. Smith. | July 1, 1902 | Webster road, section 4, No. 101, Monroe Co. | 642 | 1901 | | 29,000 00 | 20,000 00 | |
| Whitmore, Rauber & Vicinus. | June 9, 1902 | Monroe avenue road, No. 94, Monroe Co. | 594 | 1902 | | 35,400 00 | 32,300 00 | 19,137 75 |
| Board of Supervisors of Erie Co. June | 11, 1902 | Big Tree road, No. 86, Erie Co. | | | | 42,500 00 | 38,637 00 | 7,603 22 |
| Board of Supervisors of Erie Co. June | 11, 1902 | Orchard Park road, section 2, No. 66, Erie Co. | | | | 11,600 00 | 10,100 00 | 6,135 75 |
| Board of Supervisors of Erie Co. June | 11, 1902 | Orchard Park road, section 3, No. 67, Erie Co. | | | | 37,500 00 | 32,600 00 | 978 00 |
| Board of Supervisors of Erie Co. June | 11, 1902 | Orchard Park road, section 4, No. 68, Erie Co. | | | | 13,000 00 | 11,300 00 | |
| Anderson, Thomas & Brown. | June 28, 1902 | West Henrietta road, No. 62, Monroe Co. | | | | 55,000 00 | 52,200 00 | 14,485 50 |
| John Dunfee & Co. | July 2, 1902 | Scottsville road, section 1, No. 63, Monroe Co. | | | | 19,700 00 | 17,990 00 | 6,341 48 |
| Anderson, Thomas & Brown. | July 2, 1902 | Scottsville road, section 2, No. 79, Monroe Co. | | | | 67,435 00 | 55,555 00 | ..... |
| John Dunfee & Co. | July 2, 1902 | Clifton road, section 1, No. 78, Monroe Co. | | | | 31,000 00 | 29,757 00 | ..... |

WESTERN DIVISION: CONTRACTS.

393

EXTRAORDINARY REPAIRS.

(Chapter 347, Laws 1901.)

Abutments Drakes Bridge No. 60.

(Paragraph 6 item 306, section IX.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|--------------|-----------------|-----------------------|----------|---------|----------|
| J. B. Barrett..... | Leveler..... | 31 | \$4 50 per day | \$139 50 | \$8 48 | \$147 98 |
| D. S. Hollenbeck..... | Boatman..... | 18½ | 3 00 per day | 55 50 | 3 35 | 58 85 |
| A. B. Williams..... | Laborer..... | 34½ | 2 00 per day | 69 00 | 8 10 | 77 10 |
| <i>Incidental Expenses.</i> | | | | | | \$283 93 |
| Telegraph and telephone..... | | | | | \$0 05 | |
| Miscellaneous..... | | | | | 64 | 69 |
| Total..... | | | | | | \$284 62 |

Strengthening Banks.

(Paragraph 9, item 309, section X.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|--------------|-----------------|-----------------------|----------|---------|----------|
| J. B. Barrett..... | Leveler..... | 30 | \$4 50 per day | \$135 00 | \$41 08 | \$176 08 |
| D. S. Hollenbeck..... | Boatman..... | 27 | 3 00 per day | 81 00 | 23 52 | 104 52 |
| A. B. Williams..... | Laborer..... | 31 | 2 00 per day | 62 00 | 27 74 | 89 74 |
| John B. Sweeney..... | Laborer..... | 12 | 2 00 per day | 24 00 | 8 61 | 32 61 |
| <i>Incidental Expenses.</i> | | | | | | \$402 95 |
| Livery..... | | | | | \$1 00 | |
| Postage..... | | | | | 40 | |
| Telegraph and telephone..... | | | | | 40 | |
| Miscellaneous..... | | | | | 1 80 | 3 60 |
| Total..... | | | | | | \$406 55 |

Repair of Aqueducts.

(Paragraph 2, item 302, section VIII.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|--------------|-----------------|-----------------------|---------|---------|---------|
| J. B. Barrett..... | Leveler..... | 1 | \$4 50 per day | \$4 50 | \$2 26 | \$6 76 |
| D. S. Hollenbeck..... | Boatman..... | 1 | 3 00 per day | 3 00 | 2 26 | 5 26 |
| <i>Incidental Expenses.</i> | | | | | | \$12 02 |
| Telegraph and telephone..... | | | | | | 25 |
| Total..... | | | | | | \$12 27 |

EXTRAORDINARY REPAIRS—CHAPTER 347, LAWS 1901—(Continued).

Ditching Creek North of Culvert No. 69.

(Paragraph 7, item 307, section X.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|----------------------|------------------|-----------------|-----------------------|---------|---------|---------|
| J. B. Barrett..... | Leveler..... | 9 | \$4 50 per day | \$40 50 | \$5 30 | \$45 80 |
| H. G. McKelvey..... | Draughtsman..... | 3 | 4 00 per day | 12 00 | | 12 00 |
| A. B. Williams..... | Laborer..... | 13 | 2 00 per day | 26 00 | 3 35 | 29 35 |
| John B. Sweeney..... | Laborer..... | 3 | 2 00 per day | 6 00 | 4 80 | 10 80 |
| Total..... | | | | | | \$97 95 |

Repairing Abutments, Bridges 166 and 167.

(Paragraph 6, item 306, section 310.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|------------------|-----------------|-----------------------|---------|---------|---------|
| J. B. Barrett..... | Leveler..... | 5½ | \$4 50 per day | \$24 75 | \$3 80 | \$28 55 |
| H. G. McKelvey..... | Draughtsman..... | 4 | 4 00 per day | 2 00 | | 2 00 |
| A. B. Williams..... | Laborer..... | 3½ | 2 00 per day | 7 00 | 3 05 | 10 05 |
| John B. Sweeney..... | Laborer..... | 1 | 2 00 per day | 2 00 | 2 85 | 4 85 |
| <i>Incidental Expenses.</i> | | | | | | \$45 45 |
| Livery..... | | | | | \$0 50 | |
| Telegraph and telephone..... | | | | | 10 | |
| Miscellaneous..... | | | | | 70 | |
| Total..... | | | | | | \$46 75 |

Repairing Vertical Walls, North Abutment, Tonawanda Dam.

(Paragraph 5, item 305, Section XI.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|------------------|-----------------|-----------------------|---------|---------|----------|
| J. B. Barrett..... | Leveler..... | 17 | \$4 50 per day | \$76 50 | \$30 13 | \$106 63 |
| H. G. McKelvey..... | Draughtsman..... | 1 | 4 00 per day | 4 00 | | 4 00 |
| D. S. Hollenbeck..... | Boatman..... | 2 | 3 00 per day | 6 00 | 5 20 | 11 20 |
| A. B. Williams..... | Laborer..... | 9 | 2 00 per day | 18 00 | 6 20 | 24 20 |
| <i>Incidental Expenses.</i> | | | | | | \$146 03 |
| Miscellaneous..... | | | | | | 35 |
| Total..... | | | | | | \$146 38 |

EXTRAORDINARY REPAIRS—CHAPTER 347, LAWS 1901—(Continued).

Pile and Timber Docking, Tonawanda Creek.

(Paragraph 8, item 308, section XI.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|--------------|-----------------|-----------------------|---------|---------|--------|
| J. B. Barrett..... | Leveler..... | 1 | \$4 50 per day | \$4 50 | \$4 14 | \$8 64 |
| <i>Incidental Expenses.</i> | | | | | | 40 |
| Telegraph and telephone..... | | | | | | 40 |
| Total..... | | | | | | \$9 04 |

Repair of Culverts.

(Paragraph 4, item 304, section X.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|--------------|-----------------|-----------------------|---------|---------|---------|
| J. B. Barrett..... | Leveler..... | 10½ | \$4 50 per day | \$47 25 | \$5 51 | \$52 76 |
| D. S. Hollenbeck..... | Boatman..... | 2½ | 3 00 per day | 7 50 | 1 88 | 9 38 |
| A. B. Williams..... | Laborer..... | 10½ | 2 00 per day | 21 00 | 6 03 | 27 03 |
| <i>Incidental Expenses.</i> | | | | | | \$89 17 |
| Miscellaneous..... | | | | | | 30 |
| Total..... | | | | | | \$9 47 |

Repair of Locks.

(Paragraph 1, item 301, section IX.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------|--------------|-----------------|-----------------------|---------|---------|---------|
| J. B. Barrett..... | Leveler..... | 18½ | \$4 50 per day | \$83 25 | \$5 30 | \$88 55 |
| D. S. Hollenbeck..... | Boatman..... | 1 | 3 00 per day | 3 00 | 1 55 | 4 55 |
| A. B. Williams..... | Laborer..... | 3 | 2 00 per day | 6 00 | ..... | 6 00 |
| Total..... | | | | | | \$99 10 |

EXTRAORDINARY REPAIRS—CHAPTER 347, LAWS 1901—(Continued).

Repair of Bridge Abutments.

(Paragraph 6, item 306, section X.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-------------------------------|--------------|-----------------|-----------------------|---------|---------|----------|
| J. B. Barrett..... | Leveler..... | 12½ | \$4 50 per day | \$56 25 | \$8 65 | \$64 90 |
| H. J. Hemstreet..... | Leveler..... | 1 | 4 50 per day | 4 50 | | 4 50 |
| D. S. Hollenbeck..... | Boatman..... | 6 | 3 00 per day | 18 00 | 4 65 | 22 65 |
| A. B. Williams..... | Laborer..... | 4 | 2 00 per day | 8 00 | 4 55 | 12 55 |
| <i>Incidental Expenses.</i> | | | | | | \$104 60 |
| Telegraph and telephone | | | | | \$0 10 | |
| Miscellaneous..... | | | | | 38 | 48 |
| Total | | | | | | \$105 68 |

Repair of Locks.

(Paragraph 1, item 301, section VIII.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|--------------|-----------------|-----------------------|---------|---------|---------|
| J. B. Barrett..... | Leveler..... | 3 | \$4 50 per day | \$13 50 | | \$13 50 |
| <i>Incidental Expenses.</i> | | | | | | |
| Postage..... | | | | | | 29 |
| Total | | | | | | \$13 79 |

Repair of Bridge Abutments.

(Paragraph 6, item 306, section IX.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|--------------------|--------------|-----------------|-----------------------|---------|---------|--------|
| J. B. Barrett..... | Leveler..... | 2 | \$4 50 per day | \$9 00 | | \$9 00 |

EXTRAORDINARY REPAIRS—CHAPTER 347, LAWS 1901—(Concluded).

Repair of Culverts.

(Paragraph 4, item 304, section IX.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------|--------------|-----------------|-----------------------|---------|---------|---------|
| J. B. Barrett..... | Leveler..... | 6½ | \$4 50 per day | \$29 25 | \$1 73 | \$30 98 |
| D. S. Hollenbeck..... | Boatman..... | 4 | 3 00 per day | 12 00 | 1 67 | 13 67 |
| A. B. Williams..... | Laborer..... | 10 | 2 00 per day | 20 00 | 10 | 20 10 |
| Total..... | | | | | | \$64 75 |

Repair of Vertical Walls.

(Paragraph 5, item 305, section IX.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|--------------|-----------------|-----------------------|---------|---------|----------|
| J. B. Barrett..... | Leveler..... | 13½ | \$4 50 per day | \$60 75 | \$4 50 | \$65 25 |
| D. S. Hollenbeck..... | Boatman..... | 3½ | 3 00 per day | 10 50 | 1 00 | 11 50 |
| A. B. Williams..... | Laborer..... | 19 | 2 00 per day | 38 00 | | 38 00 |
| | | | | | | \$114 75 |
| <i>Incidental Expenses.</i> | | | | | | |
| Telegraph and telephone..... | | | | | \$0 10 | |
| Miscellaneous..... | | | | | 40 | 50 |
| Total..... | | | | | | \$115 25 |

CANAL.

Lyell Avenue Foot Bridge.

(Chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|----------------------|-----------------------|-----------------|-----------------------|---------|---------|----------|
| A. J. Rockwood..... | Division engineer.... | ..... | \$250 per mo. | \$4 17 | \$0 85 | \$5 02 |
| M. W. Wilbur..... | Resident engineer.... | ..... | 200 per mo. | 3 33 | | 3 33 |
| Philip H. Dater..... | Draughtsman..... | 15 | 5 00 per day | 75 00 | 10 | 75 10 |
| F. W. Searls..... | Chainman..... | 11½ | 3 00 per day | 34 50 | | 34 50 |
| Total..... | | | | | | \$117 95 |

CANAL —(Continued).

Plymouth Avenue Bridge.

(Chapter 732, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|-------------------------|-----------------|-----------------------|---------|---------|----------|
| A. J. Rockwood..... | Division engineer..... | ..... | \$250 per mo. | \$31 68 | \$13 71 | \$45 39 |
| M. W. Wilbur..... | Resident engineer..... | ..... | 200 per mo. | 14 66 | 55 | 15 21 |
| T. J. Morrison..... | Assistant engineer..... | 4 | 5 00 per day | 20 00 | 40 | 20 40 |
| H. D. Alexander..... | Assistant engineer..... | 11½ | 5 00 per day | 57 50 | 95 | 58 45 |
| H. G. McKelvey..... | Draughtsman..... | 1 | 4 00 per day | 4 00 | ..... | 4 00 |
| Tracy B. Smith..... | Rodman..... | 3 | 3 50 per day | 10 50 | ..... | 10 50 |
| <i>Incidental Expenses.</i> | | | | | | \$153 95 |
| Stationery and printing..... | | | | | \$9 59 | |
| Miscellaneous..... | | | | | 10 | 9 69 |
| Total..... | | | | | | \$163 64 |

Monroe Avenue Dry Dock Sewer.

(Chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-----------------------------|------------------|-----------------|-----------------------|---------|---------|---------|
| J. B. Barrett..... | Leveler..... | 6½ | \$4 50 per day | \$29 25 | \$1 63 | \$30 88 |
| H. G. McKelvey..... | Draughtsman..... | 2 | 4 00 per day | 2 00 | ..... | 2 00 |
| D. S. Hollenbeck..... | Boatman..... | 3 | 3 00 per day | 7 50 | 1 90 | 9 40 |
| A. B. Williams..... | Laborer..... | 3 | 2 00 per day | 6 00 | 1 65 | 7 65 |
| <i>Incidental Expenses.</i> | | | | | | \$49 93 |
| Postage..... | | | | | \$0 07 | 07 |
| Total..... | | | | | | \$50 00 |

Chapel Street Bridge.

(Chapter 573, Laws 1899; chapter 16, Laws 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|-------------------------------|-------------------------|-----------------|-----------------------|---------|---------|---------|
| A. J. Rockwood..... | Division engineer..... | ..... | \$250 per mo. | \$12 51 | \$2 38 | \$14 89 |
| M. W. Wilbur..... | Resident engineer..... | ..... | 200 per mo. | 6 66 | 3 50 | 10 16 |
| G. O. House..... | Assistant engineer..... | 2 | 5 00 per day | 10 00 | ..... | 11 15 |
| E. V. R. Payne..... | Leveler..... | 3 | 4 50 per day | 13 50 | 1 15 | 13 50 |
| <i>Incidental Expenses.</i> | | | | | | \$49 70 |
| Stowell & Cunningham..... | | | | | \$1 16 | |
| Postage..... | | | | | 01 | |
| Telegraph and telephones..... | | | | | 65 | |
| Miscellaneous..... | | | | | 5 11 | 6 93 |
| Total..... | | | | | | \$56 63 |

Eighteen Mile Creek Improvement—Bridge at Warren's Road.

(Chapter 151, Laws 1900; chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary, | Travel. | Total. |
|------------------------------|-------------------------|-----------------|-----------------------|---------|---------|----------|
| A. J. Rockwood..... | Division engineer..... | 2 | \$250 per mo. | \$4 17 | | \$4 17 |
| T. J. Morrison..... | Assistant engineer..... | 2 | 5 00 per day | 10 00 | | 10 00 |
| J. B. Barrett..... | Leveller..... | 17½ | 4 50 per day | 78 75 | \$30 94 | 109 69 |
| H. G. McKelvey..... | Draughtsman..... | 4 | 00 per day | 4 00 | | 4 00 |
| D. S. Hollenbeck..... | Boatman..... | 3½ | 3 00 per day | 9 00 | 4 25 | 13 25 |
| A. B. Williams..... | Laborer..... | 3 | 2 00 per day | 16 00 | 15 49 | 31 49 |
| John B. Sweeney..... | Laborer..... | 3 | 2 00 per day | 6 00 | 5 00 | 11 00 |
| <i>Incidental Expenses.</i> | | | | | | \$183 60 |
| Livery..... | | | | | \$3 00 | |
| Telegraph and telephone..... | | | | | 20 | |
| Total..... | | | | | | \$186 80 |

(Chapter 686, Laws of 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|-------------------------|-----------------|-----------------------|---------|---------|----------|
| A. J. Rockwood..... | Division engineer..... | .... | \$250 per mo. | \$3 34 | \$2 38 | \$10 72 |
| M. W. Wilbur..... | Resident engineer..... | .... | 200 per mo. | 49 95 | 21 60 | 71 55 |
| H. D. Alexander..... | Assistant engineer..... | 1 | 5 00 per day | 5 00 | 1 55 | 6 55 |
| Tracy B. Smith..... | Rodman..... | 53 | 3 50 per day | 182 00 | 5 96 | 187 96 |
| D. S. Hollenbeck..... | Boatman..... | 1 | 3 00 per day | 3 00 | 1 40 | 4 40 |
| A. B. Williams..... | Laborer..... | 2 | 2 00 per day | 4 00 | 2 90 | 6 90 |
| <i>Incidental Expenses.</i> | | | | | | \$288 08 |
| Postage..... | | | | | \$0 80 | |
| Livery..... | | | | | 4 00 | |
| Stationery and printing..... | | | | | 7 26 | |
| Telegraph and telephone..... | | | | | 40 | |
| Miscellaneous..... | | | | | 12 00 | |
| Total..... | | | | | | \$312 04 |

CANAL — (Continued).

Pine and Lock Street Bridge.

(Chapter 430, Laws of 1900.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|----------|---------|------------|
| A. J. Rockwood..... | Division engineer.. | ..... | \$250 per mo. | \$80 89 | \$25 53 | \$106 42 |
| M. W. Wilbur..... | Resident engineer.. | ..... | 200 per mo. | 27 98 | 10 17 | 38 15 |
| G. O. House..... | Assistant engineer.. | 134½ | 5 00 per day | 672 00 | 36 44 | 708 44 |
| E. V. R. Payne..... | Leveler..... | 46 | 4 50 per day | 207 00 | ..... | 207 00 |
| H. G. McKelvey..... | Draughtsman..... | 1 | 4 00 per day | 4 00 | ..... | 4 00 |
| Walter Dubey..... | Rodman..... | 46 | 3 50 per day | 161 00 | 35 | 161 35 |
| R. T. Webster..... | Rodman..... | 1 | 3 50 per day | 3 50 | ..... | 3 50 |
| Tracy R. Smith..... | Rodman..... | 20 | 3 50 per day | 70 00 | ..... | 70 00 |
| F. W. Hamilton..... | Rodman..... | 11 | 3 50 per day | 38 50 | ..... | 38 50 |
| A. B. Williams..... | Laborer..... | 16 | 2 00 per day | 32 00 | ..... | 32 00 |
| <i>Incidental Expenses.</i> | | | | | | \$1,369 36 |
| Stowell & Cunningham..... | ..... | ..... | ..... | \$310 82 | ..... | ..... |
| Stationery and printing..... | ..... | ..... | ..... | 25 | ..... | ..... |
| Telegraph and telephone..... | ..... | ..... | ..... | 7 36 | ..... | ..... |
| Postage..... | ..... | ..... | ..... | 2 65 | ..... | ..... |
| Miscellaneous..... | ..... | ..... | ..... | 13 20 | ..... | ..... |
| Total..... | | | | | | \$1,703 64 |

Fullamtown Bridge.

(Chapter 594, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|---------------------|----------------------|-----------------|-----------------------|---------|---------|---------|
| T. J. Morrison..... | Assistant engineer.. | 2 | \$5 00 per day | \$10 00 | ..... | \$10 00 |
| John K. Lloyd..... | Draughtsman..... | 6 | 4 50 per day | 36 00 | ..... | 36 00 |
| H. G. McKelvey..... | Draughtsman..... | 1 | 4 00 per day | 4 00 | ..... | 4 00 |
| Total..... | | | | | | \$50.00 |

CANAL — (Continued).

West Avenue Bridge.

(Chapter 549, Laws 1899.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|-------------------------|-----------------|-----------------------|----------|----------|------------|
| A. J. Rockwood..... | Division engineer ..... | ..... | \$250 per mo. | \$167 59 | \$21 01 | \$188 60 |
| M. W. Wilbur | Resident engineer..... | ..... | 200 per mo. | 27 31 | 1 35 | 28 66 |
| Philip H. Dater..... | Draughtsman..... | 158½ | 5 00 per day | 792 50 | 16 22 | 808 72 |
| R. T. Webster | Rodman..... | 25 | 3 50 per day | 87 50 | ..... | 87 50 |
| F. V. Searls..... | Chainman..... | 160 | 3 00 per day | 480 00 | 1 05 | 481 05 |
| <i>Incidental Expenses.</i> | | | | | | \$1,594 53 |
| Stowell & Cunningham..... | | | | | \$313 94 | |
| Postage..... | | | | | 19 | |
| Telegraph and telephone..... | | | | | 40 | |
| Miscellaneous..... | | | | | 1 50 | |
| | | | | | | 316 03 |
| Total | | | | | | \$1,910 56 |

Ohio Street Bridge.

(Chapter 695, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|--------------------------|-----------------|-----------------------|---------|---------|---------|
| A. J. Rockwood..... | Division engineer ..... | ..... | \$250 per mo. | \$4 17 | \$2 83 | \$7 00 |
| T. J. Morrison | Assistant engineer | 5 | 5 00 per day | 25 00 | 1 63 | 26 63 |
| E. V. R. Payne..... | Leveler..... | 1 | 4 50 per day | 4 50 | 1 10 | 5 60 |
| Philip H. Dater | Draughtsman..... | 1 | 5 00 per day | 5 00 | ..... | 5 00 |
| <i>Incidental Expenses.</i> | | | | | | \$44 23 |
| Telegraph and telephone..... | | | | | \$0 10 | |
| Stationery and printing..... | | | | | 8 77 | |
| | | | | | | 8 87 |
| Total | | | | | | \$53 10 |

CANAL — (Concluded).

Ferry Street Bridge.

(Chapter 618, Laws 1899 ; chapter 696, Laws 1901.

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|---------|
| A. J. Rockwood..... | Division engineer.. | ... | \$250 per mo. | \$29 19 | \$16 01 | \$45 20 |
| T. J. Morrison..... | Assistant engineer.. | 4 | 5 00 per day | 20 00 | | 20 00 |
| D. D. Waldo..... | Assistant engineer.. | 1 | 5 00 per day | 2 50 | 80 | 3 30 |
| H. J. Hemstreet..... | Leveler..... | 1 | 4 50 per day | 2 25 | | 2 25 |
| D. S. Hollenbeck..... | Boatman..... | 1 | 3 00 per day | 1 50 | 85 | 2 35 |
| <i>Incidental Expenses.</i> | | | | | | \$73 10 |
| Stationery and printing..... | | | | | \$7 07 | |
| Telephone and telegraph..... | | | | | 82 | |
| | | | | | | 7 89 |
| Total..... | | | | | | \$80 99 |

Erie Basin Improvement.

(Chapter 595, Laws 1902.

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|------------|
| A. J. Rockwood..... | Division engineer.. | ... | \$250 per mo. | \$50 04 | \$24 00 | \$74 04 |
| D. D. Waldo..... | Assistant engineer.. | 40 | 5 00 per day | 200 00 | 35 74 | 235 74 |
| T. J. Morrison..... | Assistant engineer.. | 7 | 5 00 per day | 35 00 | | 35 00 |
| Isaac O. Cole..... | Leveler..... | 1 | 4 50 per day | 4 50 | 3 25 | 7 75 |
| John K. Lloyd..... | Draughtsman..... | 18 1/2 | 4 50 per day | 83 25 | | 83 25 |
| H. G. McKelvey..... | Draughtsman..... | 7 | 4 00 per day | 28 00 | | 28 00 |
| Walter Dubey..... | Rodman..... | 47 | 3 50 per day | 164 50 | 10 | 164 60 |
| Jos. W. Howe..... | Rodman..... | 18 | 3 50 per day | 63 00 | 2 68 | 65 68 |
| E. J. Greiner..... | Chainman..... | 25 | 2 50 per day | 62 50 | | 62 50 |
| A. B. Williams..... | Chainman..... | 2 | 3 00 per day | 6 00 | | 6 00 |
| F. W. Gerstner..... | Chainman..... | 43 | 2 50 per day | 107 50 | 2 08 | 109 58 |
| D. S. Hollenbeck..... | Boatman..... | 46 1/2 | 3 00 per day | 139 50 | 17 48 | 156 98 |
| Raymond Menzies..... | Laborer..... | 24 | 2 00 per day | 48 00 | | 48 00 |
| W. B. Griggs..... | Laborer..... | 8 | 2 00 per day | 16 00 | 6 08 | 22 08 |
| R. C. Humphrey..... | Laborer..... | 5 | 2 00 per day | 10 00 | 1 68 | 11 68 |
| A. L. Sayer..... | Laborer..... | 20 | 2 00 per day | 40 00 | 6 10 | 46 10 |
| Geo. F. Hall..... | Laborer..... | 16 | 2 00 per day | 32 00 | 2 43 | 34 43 |
| <i>Incidental Expenses.</i> | | | | | | \$1,191 41 |
| Telegraph and telephone..... | | | | | \$3 10 | |
| Miscellaneous..... | | | | | 61 15 | |
| | | | | | | 64 25 |
| Total..... | | | | | | \$1,255 66 |

WESTERN DIVISION: BRIDGES.

403

Survey for Court of Claims.

(Chapter 419, Laws 1900; chapter 645, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|------------|
| A. J. Rockwood..... | Division engineer.. | ... | \$250 per mo. | \$45 87 | \$20 52 | \$66 39 |
| M. W. Wilbur..... | Resident engineer.. | ... | 200 per mo. | 464 23 | 79 72 | 543 95 |
| D. D. Waldo..... | Assistant engineer.. | 84½ | 5 00 per day | 422 50 | 48 00 | 470 50 |
| G. O. House..... | Assistant engineer.. | 7 | 5 00 per day | 35 00 | 9 91 | 44 91 |
| T. J. Morrison..... | Assistant engineer.. | 1 | 5 00 per day | 5 00 | | 5 00 |
| H. J. Hemstreet..... | Leveler..... | 1 | 4 50 per day | 4 50 | | 4 50 |
| Philip H. Dater..... | Draughtsman..... | 48½ | 5 00 per day | 242 50 | 21 59 | 264 09 |
| H. G. McKelvey..... | Draughtsman..... | 5½ | 4 00 per day | 22 00 | | 22 00 |
| John K. Lloyd..... | Draughtsman..... | 5 | 4 50 per day | 22 50 | | 22 50 |
| Tracy B. Smith..... | Rodman..... | 10 | 3 50 per day | 35 00 | 3 61 | 38 61 |
| R. T. Webster..... | Rodman..... | 12½ | 3 50 per day | 42 00 | | 42 00 |
| F. W. Hamilton..... | Rodman..... | 4 | 3 50 per day | 14 00 | 10 75 | 24 75 |
| F. V. Searies..... | Chainman..... | 5½ | 3 00 per day | 16 50 | 55 | 17 05 |
| D. S. Hollenbeck..... | Boatman..... | 84 | 3 00 per day | 102 00 | 30 40 | 132 40 |
| A. B. Williams..... | Laborer..... | 6 | 2 00 per day | 12 00 | 6 45 | 18 45 |
| John B. Sweeney..... | Laborer..... | 3 | 2 00 per day | 6 00 | 35 | 6 35 |
| <i>Incidental Expenses.</i> | | | | | | \$1,723 45 |
| Livery..... | | | | | \$15 00 | |
| Telegraph and telephone..... | | | | | 4 85 | |
| Miscellaneous..... | | | | | 9 72 | |
| Postage..... | | | | | 09 | |
| Total..... | | | | | | 29 66 |
| Total..... | | | | | | \$1,753 11 |

GENERAL FUND.

Chemung River Dyke.

(Chapter 475, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|----------|
| A. J. Rockwood..... | Division engineer.. | ... | \$250 per mo. | \$41 70 | \$29 50 | \$71 20 |
| G. O. House..... | Assistant engineer.. | 1 | 5 00 per day | 5 00 | 7 40 | 12 40 |
| F. W. Barrally..... | Assistant engineer.. | 12 | 5 00 per day | 60 00 | 15 30 | 75 30 |
| F. J. Morrison..... | Assistant engineer.. | 15 | 5 00 per day | 75 00 | 4 00 | 79 00 |
| H. J. Hemstreet..... | Assistant engineer.. | 5 | 5 00 per day | 25 00 | | 25 00 |
| John K. Lloyd..... | Draughtsman..... | 8½ | 4 50 per day | 38 25 | | 38 25 |
| H. G. McKelvey..... | Draughtsman..... | 4 | 4 00 per day | 16 00 | | 16 00 |
| C. J. Bean..... | Rodman..... | 12 | 3 50 per day | 42 00 | 15 30 | 57 30 |
| E. J. Greiner..... | Chainman..... | 12 | 2 50 per day | 30 00 | 14 05 | 44 05 |
| <i>Incidental Expenses.</i> | | | | | | \$418 50 |
| Livery..... | | | | | \$8 00 | |
| Postage..... | | | | | 1 00 | |
| Telegraph and telephone..... | | | | | 2 94 | |
| Miscellaneous..... | | | | | 35 41 | |
| Total..... | | | | | | 47 35 |
| Total..... | | | | | | \$465 85 |

REPORT OF STATE ENGINEER.

GENERAL FUND — (Continued).

Onoville Bridge.

(Chapter 467, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|----------|
| M. W. Wilbur..... | Resident engineer.. | 5 | \$200 per mo. | \$29 97 | \$15 30 | \$45 27 |
| F. J. Morrison..... | Assistant engineer.. | 7 | 5 00 per day | 25 00 | | 25 00 |
| D. D. Waldo..... | Assistant engineer.. | 5 | 5 00 per day | 35 00 | 14 70 | 49 70 |
| J. B. Barrett..... | Leveler..... | 4 | 4 50 per day | 18 00 | 13 80 | 31 80 |
| H. J. Hemstreet..... | Leveler..... | 4 | 4 50 per day | 18 00 | | 18 00 |
| John K. Lloyd..... | Draughtsman..... | 2 | 4 50 per day | 9 00 | | 9 00 |
| H. G. McKelvey..... | Draughtsman..... | 4½ | 4 00 per day | 18 00 | | 18 00 |
| D. S. Hollenbeck..... | Boatman..... | 4 | 3 00 per day | 12 00 | 13 70 | 25 70 |
| <i>Incidental Expenses.</i> | | | | | | \$222 47 |
| Postage..... | | | | | \$0 10 | |
| Stationery and printing..... | | | | | 8 66 | |
| Livery..... | | | | | 2 00 | |
| Telegraph and telephone..... | | | | | 75 | |
| Miscellaneous..... | | | | | 16 02 | |
| | | | | | | 27 53 |
| Total..... | | | | | | \$250 00 |

Cassadaga Lake's Outlet.

(Chapter 594, Laws 1902.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|---------|---------|----------|
| D. D. Waldo..... | Assistant engineer.. | 9 | \$5 00 per day | \$45 00 | \$21 20 | \$66 20 |
| D. S. Hollenbeck..... | Boatman..... | 9 | 3 00 per day | 27 00 | 22 70 | 49 70 |
| <i>Incidental Expenses.</i> | | | | | | \$115 90 |
| Labor..... | | | | | \$28 00 | |
| Postage..... | | | | | 50 | |
| Telegraph and telephone..... | | | | | 1 65 | |
| Miscellaneous..... | | | | | 3 49 | |
| | | | | | | 33 64 |
| Total..... | | | | | | \$149 54 |

Ordinary Repairs.

(Chapter 418, Laws 1900: Chapter 644, Laws 1901.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|----------------------|-----------------|-----------------------|------------|----------|-------------|
| A. J. Rockwood..... | Division engineer.. | .... | \$250 00 per mo. | \$1,316 25 | \$177 54 | \$1,493 79 |
| M. W. Wilbur..... | Resident engineer.. | .... | 200 00 per mo. | 1,299 72 | 71 50 | 1,371 22 |
| T. J. Morrison..... | Assistant engineer.. | 34 | 5 00 per day | 170 00 | 6 79 | 176 79 |
| F. W. Barrally..... | Assistant engineer.. | 16 | 5 00 per day | 80 00 | 2 31 | 82 31 |
| D. D. Waldo..... | Assistant engineer.. | 36 | 5 00 per day | 180 00 | 28 11 | 208 11 |
| G. O. House..... | Assistant engineer.. | 6½ | 5 00 per day | 32 50 | 18 51 | 51 01 |
| H. D. Alexander..... | Assistant engineer.. | 6 | 5 00 per day | 30 00 | 10 16 | 40 16 |
| Isaac O. Cole..... | Leveler..... | 1 | 4 50 per day | 4 50 | 2 24 | 6 74 |
| H. J. Hemstreet..... | Leveler..... | 7½ | 4 50 per day | 33 75 | 1 10 | 33 85 |
| J. B. Barrett..... | Leveler..... | 17 | 4 50 per day | 76 50 | 11 95 | 88 45 |
| C. G. Harger, Jr..... | Financial clerk.... | 313 | 5 00 per day | 1,565 00 | ..... | 1,565 00 |
| Anna M. Lorscheider | Stenographer..... | 261 | 2 25 per day | 587 25 | ..... | 587 25 |
| Anna M. Lorscheider | Stenographer..... | ..... | 75 00 per mo. | 150 00 | ..... | 150 00 |
| Philip H. Dater..... | Draughtsman..... | 82 | 5 00 per day | 410 00 | 15 92 | 425 92 |
| H. G. McKelvey..... | Draughtsman..... | 44½ | 4 00 per day | 178 00 | ..... | 178 00 |
| John K. Lloyd..... | Draughtsman..... | 18 | 4 50 per day | 81 00 | ..... | 81 00 |
| J. A. Brous..... | Draughtsman..... | 7 | 4 50 per day | 31 50 | 15 83 | 47 33 |
| R. T. Webster..... | Rodman..... | 252½ | 3 50 per day | 883 75 | 2 76 | 886 51 |
| Walter Dubey..... | Rodman..... | 4 | 3 50 per day | 14 00 | 6 57 | 20 57 |
| Joseph W. Howe..... | Rodman..... | 1 | 3 50 per day | 3 50 | 2 19 | 5 69 |
| Thad. L. Wilson..... | Rodman..... | 27 | 3 50 per day | 94 50 | 23 06 | 117 56 |
| Tracy B. Smith..... | Rodman..... | 4 | 3 50 per day | 14 00 | 2 41 | 16 41 |
| F. W. Hamilton..... | Rodman..... | 42½ | 3 50 per day | 148 75 | 6 88 | 155 63 |
| C. J. Bean..... | Rodman..... | 17 | 3 50 per day | 59 50 | ..... | 59 50 |
| J. J. Montgomery..... | Rodman..... | 18 | 3 50 per day | 63 00 | 5 72 | 68 72 |
| F. V. Searls..... | Chainman..... | 56 | 3 00 per day | 168 00 | 12 75 | 180 75 |
| A. B. Williams..... | Chainman..... | 91 | 3 00 per day | 273 00 | 2 85 | 275 85 |
| E. J. Greiner..... | Chainman..... | 17 | 2 50 per day | 42 50 | ..... | 42 50 |
| W. H. Snyder..... | Chainman..... | 25 | 2 50 per day | 62 50 | 6 43 | 68 93 |
| D. S. Hollenbeck..... | Boatman..... | 17 | 3 00 per day | 51 00 | 22 92 | 73 92 |
| A. B. Williams..... | Laborer..... | 12½ | 2 00 per day | 25 00 | 2 59 | 27 59 |
| John B. Sweeney..... | Laborer..... | 4 | 2 00 per day | 8 00 | ..... | 8 00 |
| John Patterson..... | Laborer..... | 1 | 2 00 per day | 2 00 | 2 84 | 4 84 |
| E. P. Strowger..... | Laborer..... | 1 | 2 00 per day | 2 00 | 2 09 | 4 09 |
| Albert T. Wilbeck..... | Laborer..... | ½ | 2 00 per day | 1 00 | 1 10 | 1 10 |
| A. N. Bentley..... | Laborer..... | 12 | 2 00 per day | 24 00 | 1 87 | 25 87 |
| Chas. R. Zorsch..... | Laborer..... | 25 | 2 00 per day | 50 00 | ..... | 50 00 |
| W. S. Pratt..... | Laborer..... | 14½ | 2 00 per day | 27 50 | 1 24 | 28 74 |
| <i>Incidental Expenses.</i> | | | | | | \$8,709 70 |
| Stationery and printing..... | | | | \$830 41 | | |
| Telegraph and telephone..... | | | | 478 56 | | |
| Livery..... | | | | 79 50 | | |
| Rent..... | | | | 816 00 | | |
| Postage..... | | | | 154 94 | | |
| Miscellaneous..... | | | | 456 70 | | |
| Total..... | | | | | | \$11,525 81 |

Improvement of Public Highways.

(Chapter 115, Laws of 1898.)

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|----------------------|----------------------|-----------------|-----------------------|------------|----------|------------|
| A. J. Rockwood..... | Division engineer.. | .... | \$250 per mo. | \$1,161 73 | \$437 25 | \$1,598 98 |
| M. W. Wilbur..... | Resident engineer.. | .... | 200 per mo. | 446 22 | 190 61 | 636 83 |
| G. O. House..... | Assistant engineer.. | 90.1 | 5 00 per day | 450 50 | 30 99 | 481 49 |
| D. D. Waldo..... | Assistant engineer.. | 85½ | 5 00 per day | 427 50 | 16 32 | 443 82 |
| T. J. Morrison..... | Assistant engineer.. | 235 | 5 00 per day | 1,175 00 | 9 10 | 1,184 10 |
| F. W. Barrally..... | Assistant engineer.. | 222 | 5 00 per day | 1,110 00 | 124 24 | 1,234 24 |
| H. D. Alexander..... | Assistant engineer.. | 297½ | 5 00 per day | 1,487 50 | 40 36 | 1,527 86 |
| E. V. R. Payne..... | Assistant engineer.. | 106 | 5 00 per day | 530 00 | 4 76 | 534 76 |

Improvement of Public Highways — (Continued).

| NAME. | Rank. | Number of days. | Rate of compensation. | Salary. | Travel. | Total. |
|------------------------------|---------------------|-----------------|-----------------------|----------|----------|-------------|
| H. J. Hemstreet..... | Assistant engineer. | 77 | \$5 00 per day | \$385 00 | \$17 79 | \$402 79 |
| Isaac O. Cole..... | Assistant engineer. | 59 | 5 00 per day | 295 00 | 44 15 | 339 15 |
| J. B. Barrett..... | Leveler..... | 112 | 4 50 per day | 504 00 | 27 83 | 531 33 |
| E. V. R. Payne..... | Leveler..... | 70 | 4 50 per day | 315 00 | 81 14 | 396 14 |
| Isaac O. Cole..... | Leveler..... | 176 | 4 50 per day | 792 00 | 140 31 | 932 31 |
| H. J. Hemstreet..... | Leveler..... | 220 | 4 50 per day | 990 00 | 50 | 990 50 |
| Charles W. Edwards... | Leveler..... | 112 | 4 50 per day | 504 00 | 78 71 | 582 71 |
| F. H. Crafts..... | Leveler..... | 50 | 4 50 per day | 225 00 | 22 05 | 247 05 |
| John K. Lloyd..... | Draughtsman..... | 110 | 4 50 per day | 495 00 | 10 | 495 10 |
| H. G. McKelvey..... | Draughtsman..... | 233½ | 4 00 per day | 934 00 | 40 | 934 40 |
| R. F. Webster..... | Rodman..... | 24½ | 3 50 per day | 85 75 | 4 33 | 90 08 |
| Tracy B. Smith..... | Rodman..... | 167 | 3 50 per day | 584 50 | 51 46 | 635 96 |
| Joseph W. Howe..... | Rodman..... | 208 | 3 50 per day | 728 00 | 152 17 | 880 17 |
| Thad. L. Wilson..... | Rodman..... | 28 | 3 50 per day | 98 00 | 17 54 | 115 54 |
| C. J. Bean..... | Rodman..... | 204 | 3 50 per day | 714 00 | 82 30 | 796 30 |
| Walter Dubey..... | Rodman..... | 127 | 3 50 per day | 444 50 | 72 27 | 516 77 |
| F. U. Hamilton..... | Rodman..... | 169 | 3 50 per day | 591 50 | 81 45 | 672 95 |
| J. J. Montgomery..... | Rodman..... | 58 | 3 50 per day | 203 00 | 26 52 | 229 52 |
| Walter J. Plogsted..... | Rodman..... | 33 | 3 50 per day | 115 50 | 11 46 | 126 96 |
| A. S. Whitbeck..... | Rodman..... | 54 | 3 50 per day | 189 00 | 22 79 | 211 79 |
| F. V. Searls..... | Rodman..... | 54 | 3 50 per day | 189 00 | 23 80 | 212 80 |
| F. W. Ross..... | Rodman..... | 43 | 3 50 per day | 150 50 | 10 50 | 161 00 |
| C. P. Fink..... | Rodman..... | 31 | 3 50 per day | 108 50 | 2 84 | 111 34 |
| E. C. Taggart..... | Rodman..... | 25 | 3 50 per day | 87 50 | 10 03 | 97 53 |
| D. S. Hallenbeck..... | Boatman..... | 83 | 3 00 per day | 249 00 | 31 73 | 280 73 |
| F. V. Searls..... | Chainman..... | 28 | 3 00 per day | 84 00 | 11 55 | 95 55 |
| A. B. Williams..... | Chainman..... | 11 | 3 00 per day | 33 00 | 4 95 | 37 95 |
| E. A. Bonney..... | Chainman..... | 29 | 3 00 per day | 87 00 | 14 83 | 101 83 |
| F. W. Gerstner..... | Chainman..... | 174 | 2 50 per day | 435 00 | 91 23 | 526 23 |
| Lawrence Kavanaugh..... | Chainman..... | 56 | 2 50 per day | 140 00 | 19 66 | 159 66 |
| A. W. Gillis..... | Chainman..... | 50 | 2 50 per day | 125 00 | 11 15 | 136 15 |
| Charles F. Swan..... | Chainman..... | 131 | 2 50 per day | 327 50 | 27 70 | 355 20 |
| E. J. Greiner..... | Chainman..... | 118 | 2 50 per day | 295 00 | 48 25 | 343 25 |
| William F. Wright..... | Chainman..... | 12 | 2 50 per day | 30 00 | 1 53 | 31 53 |
| J. H. Sinclair..... | Chainman..... | 3 | 2 50 per day | 7 50 | 2 28 | 9 78 |
| E. L. Keeler..... | Chainman..... | 19 | 2 50 per day | 47 50 | 10 26 | 57 76 |
| Albert T. Witbeck..... | Chainman..... | 29 | 2 50 per day | 72 50 | 9 76 | 82 26 |
| Harry D. Waldo..... | Chainman..... | 28 | 2 50 per day | 70 00 | 5 40 | 75 40 |
| Timothy Buckley..... | Chainman..... | 26 | 2 50 per day | 65 00 | 14 32 | 79 32 |
| A. B. Chappell..... | Chainman..... | 20 | 2 50 per day | 50 00 | 9 00 | 59 00 |
| John P. Kelley..... | Chainman..... | 25 | 2 50 per day | 62 50 | 7 68 | 70 18 |
| E. P. Strowger..... | Chainman..... | 19 | 2 50 per day | 47 50 | 1 51 | 49 00 |
| A. B. Williams..... | Laborer..... | 26 | 2 00 per day | 52 00 | 10 90 | 62 90 |
| John B. Swesney..... | Laborer..... | 129½ | 2 00 per day | 259 00 | 5 26 | 264 26 |
| John Patterson..... | Laborer..... | 52 | 2 00 per day | 104 00 | 52 81 | 156 81 |
| E. P. Strowger..... | Laborer..... | 202 | 2 00 per day | 404 00 | 128 05 | 532 05 |
| Richard C. Humphrey..... | Laborer..... | 165 | 2 00 per day | 330 00 | 141 57 | 471 57 |
| Harry D. Waldo..... | Laborer..... | 133 | 2 00 per day | 266 00 | 79 99 | 345 99 |
| Raymond Menzies..... | Laborer..... | 120 | 2 00 per day | 240 00 | 85 85 | 325 85 |
| J. E. Bowen..... | Laborer..... | 91 | 2 00 per day | 182 00 | 32 32 | 214 32 |
| Thomas J. Love..... | Laborer..... | 106 | 2 00 per day | 212 00 | 16 15 | 228 15 |
| Henry Gaylor..... | Laborer..... | 97 | 2 00 per day | 194 00 | 9 27 | 203 27 |
| W. B. Griggs..... | Laborer..... | 60 | 2 00 per day | 120 00 | 2 65 | 122 65 |
| Albert T. Witbeck..... | Laborer..... | 50½ | 2 00 per day | 101 00 | 24 19 | 125 19 |
| Harry A. Thompson..... | Laborer..... | 52 | 2 00 per day | 104 00 | 28 88 | 132 88 |
| D. C. Salverda..... | Laborer..... | 64 | 2 00 per day | 128 00 | 16 30 | 144 30 |
| W. I. Palmer..... | Laborer..... | 75 | 2 00 per day | 150 00 | 28 03 | 178 03 |
| Alexander N. Bentley..... | Laborer..... | 42 | 2 00 per day | 84 00 | 11 06 | 95 06 |
| George F. Hall..... | Laborer..... | 57 | 2 00 per day | 114 00 | 7 75 | 121 75 |
| A. L. Sayer..... | Laborer..... | 64 | 2 00 per day | 128 00 | 11 96 | 139 96 |
| B. E. Moses..... | Laborer..... | 41 | 2 00 per day | 82 00 | 6 51 | 88 51 |
| Theo. W. Tucker..... | Laborer..... | 26 | 2 00 per day | 52 00 | 1 60 | 53 60 |
| <i>Incidental Expenses.</i> | | | | | | \$24,910 15 |
| Stationery and printing..... | | | | | \$7 16 | |
| Postage..... | | | | | 14 97 | |
| Livery..... | | | | | 1,239 75 | |
| Telegraph and telephone..... | | | | | 60 14 | |
| Office rent..... | | | | | 40 00 | |
| Miscellaneous..... | | | | | 887 10 | |
| Total..... | | | | | | 2,249 12 |
| Total..... | | | | | | \$27,159 27 |

Improvement of Public Highways.

(Chapter 115, Laws 1898 ; Chapter 53, Laws 1902.)

| NAME OF ROAD. | Number. | Town. | County. | Total. |
|--------------------|---------|------------------|-------------|------------|
| Hudson Avenue..... | 15 | Irondequoit..... | Monroe..... | \$3,811 87 |

**Summary of Engineering Expenses upon the Western Division,
New York State Canals, for the Fiscal Year Ending September
30, 1902.**

| | AUTHORIZED BY | | Amount. |
|--|---------------|-------|-------------|
| | Chap. | Laws. | |
| <i>Extraordinary Repairs of Canals.</i> | | | |
| Abutments, Drake's bridge, No. 60..... | 347 | 1901 | \$284 62 |
| Strengthening banks..... | 347 | 1901 | 406 55 |
| Repair of aqueducts..... | 347 | 1901 | 12 25 |
| Ditching creek north of culvert No. 69..... | 347 | 1901 | 97 95 |
| Repairing abutments, bridges Nos. 166 and 167..... | 347 | 1901 | 46 75 |
| Repairing vertical walls, north abutment, Tonawanda dam..... | 347 | 1901 | 146 38 |
| Pile and timber docking, Tonawanda Creek..... | 347 | 1901 | 9 04 |
| Repair of culverts, section 10..... | 347 | 1901 | 89 47 |
| Repair of locks, section 9..... | 347 | 1901 | 99 10 |
| Repair of bridge abutments, section 10..... | 347 | 1901 | 105 08 |
| Repair of locks, section 8..... | 347 | 1901 | 13 79 |
| Repair of bridge abutments, section 9..... | 347 | 1901 | 9 00 |
| Repair of culverts, section 9..... | 347 | 1901 | 64 75 |
| Repair of vertical walls, section 9..... | 347 | 1901 | 115 25 |
| <i>Canal Improvements.</i> | | | |
| Lyell avenue foot bridge..... | 645 | 1901 | 117 95 |
| Plymouth avenue bridge..... | 732 | 1901 | 163 64 |
| Monroe avenue dry dock sewer..... | 645 | 1901 | 50 00 |
| Chapel street bridge..... | 573 | 1899 | 56 63 |
| | 16 | 1900 | |
| Eighteen Mile Creek improvement, bridge at Warren's road.... | 151 | 1900 | 186 80 |
| | 645 | 1901 | |
| Vertical wall, Eagle Harbor..... | 686 | 1901 | 312 04 |
| Pine and Lock street bridge..... | 430 | 1900 | 1,703 64 |
| Fullamtown bridge..... | 594 | 1902 | 50 00 |
| West avenue bridge..... | 549 | 1899 | 1,910 56 |
| Ohio street bridge..... | 695 | 1901 | 53 10 |
| Ferry street bridge..... | 615 | 1899 | 80 99 |
| | 696 | 1901 | |
| Erie basin improvement..... | 595 | 1902 | 1,255 66 |
| Survey for Court of Claims..... | 645 | 1901 | 1,753 11 |
| <i>General Fund.</i> | | | |
| Onoville bridge..... | 467 | 1902 | 250 00 |
| Cassadaga lakes outlet..... | 594 | 1902 | 149 54 |
| Glen Creek improvement..... | 699 | 1901 | 488 20 |
| Cattaraugus Creek bridge..... | 685 | 1901 | 208 20 |
| Chemung River Dyke..... | 475 | 1902 | 465 85 |
| | 115 | 1898 | |
| | 569 | 1899 | |
| | 419 | 1900 | 27,159 27 |
| Highway Improvements..... | 293 | 1900 | |
| | 642 | 1901 | |
| | 115 | 1898 | 3,811 87 |
| | 53 | 1902 | |
| Ordinary Repairs..... | 418 | 1900 | 11,525 81 |
| | 644 | 1901 | |
| | | | \$53,252 86 |

INDEX.

Annual Report of State Engineer and Surveyor of New York, 1902.

| Addresses of; at Good Roads Convention: | PAGE. |
|--|---------------|
| Bathey, Arthur M., editor "Tri-Weekly Tribune"..... | 182 |
| Bond, Edward A., State Engineer of New York..... | 118, 160 |
| Dodge, Martin, director U. S. Office Road Inquiries..... | 129 |
| Haupt, Lewis M., C. E..... | 191 |
| Judson, Wm. Pierson, Deputy State Engr. of N. Y..... | 131, 174, 186 |
| Lyon, Frank D..... | 169 |
| Moore, W. H., president Nat. Good Roads Association..... | 120 |
| North, Edward P., C. E..... | 188 |
| Odell, Governor | 178 |
| O'Neil, William F., chairman..... | 137 |
| Power, Frederick M..... | 179 |
| Ross, Charles W..... | 132 |
| See, Joseph B..... | 176 |
| Washburn, Lucius H., rep. League of American Wheelmen... | 174 |
| White, W. Pierrepont | 127, 144 |
| Armstrong State-aid law..... | 103 |
| Aqueducts: | |
| Cowasselon | 44, 319 |
| Onondaga | 296 |
| Repairs | 45, 393 |
| Richmond | 44, 320 |
| Banks, strengthening | 393 |
| Bench marks, along canals..... | 37 |
| Boards: | |
| Canal | 5 |
| Canvassers | 5 |
| Commissioners of Land Office..... | 5 |
| Equalization and assessment..... | 5 |
| Bond Creek improvement..... | 45, 268 |

| | PAGE. |
|---|------------------------|
| Bonding system proposed for highways | 22, 165, 171 |
| Bond and Wood Creeks: | |
| Removing obstructions | 45, 268 |
| Boundaries of State..... | 32, 67 |
| Canada | 32, 67, 281 |
| Connecticut | 35 |
| Massachusetts | 35 |
| New Jersey | 36 |
| New York | 32 |
| Pennsylvania | 37 |
| St. Lawrence county..... | 37, 46, 211, 273 |
| Vermont | 34 |
| Brasher Falls dam: | |
| St. Regis River..... | 45, 300, 331, 333 |
| Bridges: | |
| Built and repaired: | |
| Allegany Indian Reservation..... | 206, 355 |
| Buffalo: | |
| Elk Street, Clark & Skinner canal..... | 206, 354 |
| Ferry Street, Black Rock Harbor..... | 46, 207, 352, 393, 402 |
| Ohio Street | 46, 401 |
| Carthage | 299 |
| Cohoes: | |
| Ontario Street | 45, 223, 269, 281 |
| Drake's | 44, 341, 393 |
| Eighteen-Mile Creek | 207, 239 |
| Fort Plain: | |
| Otsuago Creek | 45, 229, 270, 281 |
| Fullamtown | 46, 354, 400 |
| Fulton: | |
| Broadway | 44, 207, 320, 331 |
| Geddes: | |
| Bridge Street | 44, 320, 331 |
| Green's (Glens Falls feeder)..... | 45, 227, 268, 281 |
| Lockport: | |
| Chapel Street | 46, 344, 392, 396 |
| Pine and Lock Streets..... | 46, 347, 392, 400 |
| View of facing | 345 |

Bridges — Continued:**Built and repaired — Continued:**

| | PAGE. |
|--------------------------------------|------------------------|
| Middleport: | |
| Vernon Street | 392 |
| Onoville | 46, 393, 404 |
| Penn Yan: | |
| Liberty Street | 45, 302, 323, 334 |
| Pratt's Landing | 46, 298, 329, 331 |
| Rexford Flats | 45, 228, 270, 281 |
| Rochester: | |
| Lyll Avenue | 46, 343, 392, 397 |
| Plymouth Avenue | 46, 350, 393, 398 |
| West Avenue | 46, 345, 392, 401 |
| View of, facing | 346 |
| Rome: | |
| South James Street | 301 |
| Seneca Falls: | |
| Rumsey Street | 45, 301, 327, 331, 334 |
| Syracuse: | |
| Catharine Street | 45, 302, 324, 331, 334 |
| Salina Street | 207 |
| Tonawanda (2½ miles west of) | 393 |
| Utica: | |
| Schuyler Street | 45, 302, 323, 331, 334 |
| Washington Street | 45, 302, 323, 331, 334 |
| Versailles: | |
| Cattaraugus Indian Reservation | 46, 356, 393, 405 |
| Waterford: | |
| Near Burton's Sawmill | 45, 225, 268, 281 |
| Fulton Street | 45, 227, 269, 281 |
| Watervliet: | |
| Fourteenth Street | 45, 229, 270, 281 |
| Upper Side-cut | 207 |
| Westernville | 44, 320 |
| Whitesboro: | |
| Brainard Street | 45, 303, 324, 331, 334 |
| Bridges: | |
| Estimated and planned: | |
| Allegany Indian Reservation | 206 |

Bridges — Continued:**Estimated and planned — Continued:**

| | |
|--|--------------|
| Buffalo: | PAGE. |
| Elk Street, Clark and Skinner canal..... | 206 |
| Ferry Street, Black Rock Harbor..... | 207 |
| Canajoharie: | |
| Church Street | 207 |
| Eighteen-Mile Creek | 207 |
| Fort Plain (Otsquago Creek)..... | 206 |
| Rochester: | |
| Plymouth Avenue | 206 |
| West Avenue | 210 |
| Rome: | |
| South James Street | 206 |
| Standard Highway | 207 |

Bridges:

| | | |
|--------------------------------------|-----|---------|
| Bureau of design and inspection..... | 29, | 47, 206 |
| Canada boundary line..... | 32, | 67, 281 |

Canal:

| | | |
|--------------------------|--------------|----------|
| Barge canal survey | 8, 46, | 271, 281 |
| Board | | 5 |
| Black River | 44, 46, 294, | 318, 331 |
| Cayuga and Seneca..... | | 44, 318 |
| Champlain | 7, 44, 45, | 225, 267 |
| Clark and Skinner: | | |
| Contracts..... | | 8, 57 |
| Commerce: | | |
| Lake harbors for..... | | 60 |
| Erie | | 7, 44 |
| Eastern Division: | | |
| Extent of | | 225 |
| Report | | 223 |
| Middle Division: | | |
| Report | | 292 |
| Western Division: | | |
| Extent of | | 341 |
| Report | | 339 |
| Hempstead Bay | | 32 |
| History | | 6 |

INDEX.

413

| | |
|--|--------------|
| Canal — Continued: | PAGE. |
| Jamaica Bay | 32 |
| Maintenance 6, 225, 267, 294, 317, | 341, 394 |
| Oswego 7, 44, 45, 66, | 298, 317 |
| Shinnecock and Peconic..... 31, 45, | 226, 272 |
| Specifications for | 8 |
| Welland Canal, use of..... | 66 |
| Bulkheads: | |
| At "Braddocks" or Battle Island Dam, Oswego River..... | 325 |
| Bureau: | |
| Bridge design | 29, 47, 206 |
| Land | 28, 203 |
| Canal Commerce: | |
| Lake Ontario harbors for..... | 60 |
| Canandaigua Lake: | |
| Dredging of 45, | 298, 321 |
| Cassadaga Lake: | |
| Dredging outlet | 358, 404 |
| Cayuga Lake: | |
| Dredging of | 322 |
| Water records | 293, 337 |
| Cayuga and Seneca Canal | 45 |
| Cement: | |
| Municipal works | 25 |
| Report.. | 196 |
| Specifications | 25 |
| State works | 25 |
| Tests | 198 |
| Use | 6 |
| Charlotte Harbor | 62 |
| Commissions: | |
| Electrical laboratory | |
| Floods | |
| Land Office | |
| Contracts: | |
| Completed during 1902..... 54, 287, | 334, 392 |
| "Nine million" work | 57 |
| Pending 50, 282, | 335, 393 |
| Termination of | 57 |

| | PAGE. |
|--|-----------------------------|
| Connecticut boundary line..... | 35 |
| Co-operation with U. S. G. S.: | |
| Measurement of streams. (See Supplement.)..... | 38, 46, 230, 279 |
| Survey of State. (See Supplement.)..... | 30, 46, 230, 279 |
| Court of Claims surveys..... | 27, 229, 274, 329, 358, 403 |
| Creeks: | |
| Improvement of: | |
| Bond | 45, 268 |
| Eighteen-Mile | 351, 399 |
| Glen | 46, 348, 391, 405 |
| Tonawanda | 395 |
| Wood | 45, 268 |
| Cross Lake: | |
| Water records | 293, 337 |
| Culverts, repairs of..... | 46 |
| Durhamville | 294 |
| Fayetteville feeder | 46, 319 |
| Roads | 359 |
| Utica | 296 |
| Dams: | |
| Beaver River. (See Annual Report State Engineer, 1900, p. 438) | 228, 272, 283 |
| Brasher Falls | |
| St. Regis River..... | 45, 300, 331, 333 |
| Forestport: | |
| Black River | 46, 300, 331, 333 |
| Oriskany | 44, 318 |
| Oswego River: | |
| Battle Island or "Braddocks"..... | 45, 298, 325, 333 |
| High Dam | 299, 333 |
| Minetto | 45, 299, 325, 333 |
| Tonawanda | 44, 341 |
| Discharge of Streams. (See Supplement.) | |
| Dredging: | |
| Canandaigua Lake | 45, 298, 321 |
| Cassadaga Lake outlet..... | 358, 404 |
| Cayuga Lake | 322 |

| | |
|---|-------------------|
| Dredging — Continued: | PAGE. |
| Erie Basin, Buffalo..... | 353, 402 |
| Saranac River | 227 |
| Dykes: | |
| Castorland (Black River)..... | 46, 328 |
| Elmira (Chemung River)..... | 46, 357, 403 |
| Eagle Harbor: | |
| Vertical wall | 46, 349, 399 |
| Eighteen-Mile Creek improvement..... | 351, 399 |
| Engineering expenses: | |
| Divisions: | |
| Eastern | 267 |
| Middle | 317 |
| Western | 393 |
| Summary | 47 |
| Erie Basin, Buffalo: | |
| Deepening of | 353, 402 |
| Extraordinary repairs of canals: | |
| Division: | |
| Eastern | 225, 267 |
| Middle | 297, 318 |
| Western | 342, 393 |
| Summary | 44, 331 |
| Fair Haven Harbor..... | 63 |
| Feeders: | |
| Fayetteville | 319 |
| Field-notes, maps: | |
| Old | 275 |
| Field-work: | |
| Canada boundary line..... | 88 |
| Fort Montgomery: | |
| History of | 34 |
| Fuller law | 107 |
| Gates: | |
| Seneca Lake outlet..... | 45, 297, 326, 333 |
| View of facing | 298 |

| | |
|--|-------------------|
| Geddes Basin: | PAGE. |
| Fence around | 44, 319 |
| Geneva: | |
| Sewers through towpath..... | 45, 327 |
| Towpath extension | 45, 301, 326 |
| Glen Creek improvement..... | 46, 348, 391, 405 |
| Good Roads. (See "Highway Improvement.") | |
| Great Sodus Harbor..... | 63 |
| Guard lock and gates: | |
| Seneca Lake outlet..... | 45, 297, 326, 333 |
| View of facing | 298 |
| Harbors on Lake Ontario..... | 60 |
| Charlotte | 62 |
| Fair Haven | 63 |
| Great Sodus | 63 |
| Little Sodus | 63 |
| Oak Orchard | 61 |
| Olcott | 61 |
| Oswego | 64 |
| Pultneyville | 62 |
| Highways: | |
| Convention | 118 |
| Examiner, special | 12, 194 |
| Laws | 103, 107 |
| Highway improvements | 9 |
| Appropriations for | 10 |
| Completed each year..... | 10 |
| Convention | 118 |
| Engineering expenses | 47 |
| Laws | 103, 107 |
| Maintenance of | 361 |
| Material for, tests of..... | 114 |
| Money system | 107 |
| Petitions for | 9 |
| Prison labor | 20 |
| Surveys for. (See "Surveys for Highways.") | |
| Highways improved: | |
| Albany county: | |
| Delaware turnpike, section 1, No. 7..... | 231, 287 |
| Delaware turnpike, section 2, No. 41..... | 239, 288 |
| Delmar-Slingerlands, No. 92..... | 255, 284 |

Highways improved — Continued:

| Albany county — Continued: | PAGE. |
|--------------------------------------|--------------|
| Loudon road, section 1, No. 22..... | 234, 287 |
| Loudon road, section 2, No. 119..... | 263, 285 |
| North road, No. 124..... | 264, 286 |
| Broome county: | |
| Chenango River, No. 47..... | 315, 336 |
| (Views facing pages 24 and 34.) | |
| Lestershire, No. 125..... | 314, 335 |
| Chemung county: | |
| South Broadway, No. 30..... | 364, 391 |
| Southport, section 2, No. 28..... | 363, 391 |
| Southport, section 3, No. 29..... | 364, 391 |
| Chenango county: | |
| Norwich-Plymouth, No. 112..... | 312, 335 |
| Clinton county: | |
| Plattsburg-Keeseville, No. 56..... | 243, 289 |
| Windsor road, section 1, No. 57..... | 250, 283 |
| Cortland county: | |
| Blodgett's Mills, No. 111..... | 312, 335 |
| Cuyler, No. 40..... | 314, 336 |
| Preble-Homer, No. 123..... | 313, 335 |
| Delaware county: | |
| Griffins' Corners, No. 36..... | 247, 283 |
| Erie county: | |
| Big Tree, No. 86..... | 376, 392 |
| Main Street, section 1, No. 69..... | 371, 392 |
| Main Street, section 2, No. 87..... | 377, 392 |
| Orchard Park, section 2, No. 66..... | 368, 392 |
| Orchard Park, section 3, No. 67..... | 369, 392 |
| Orchard Park, section 4, No. 68..... | 370, 392 |
| Transit, section 1, No. 88..... | 378, 392 |
| Transit, section 2, No. 89..... | 379, 392 |
| Fulton county: | |
| Argersinger, No. 109..... | 260, 285 |
| Gloversville-Mayfield, No. 33..... | 247, 283 |
| Main Street, or Briggs, No. 110..... | 260, 285 |
| Herkimer county: | |
| Frankfort-Utica, No. 14..... | 282 |

Highways improved — Continued:

| Monroe county: | PAGE. |
|---|--------------|
| Buffalo, section 1, No. 82..... | 375, 391 |
| Buffalo, section 2, No. 83..... | 375, 392 |
| Clifton, No. 78..... | 372, 392 |
| Fairport, No. 60..... | 365, 391 |
| Hamlin, section 1, No. 80..... | 373, 392 |
| Hamlin, section 2, No. 81..... | 374, 392 |
| Monroe Avenue, No. 94..... | 379, 392 |
| Pittsford, No. 61..... | 366, 391 |
| Scottsville, section 1, No. 63..... | 368, 392 |
| Scottsville, section 2, No. 79..... | 372, 392 |
| Webster, section 1, No. 96..... | 380, 392 |
| Webster, section 2, No. 99..... | 381, 392 |
| (Views facing page 30.) | |
| Webster, section 3, No. 100..... | 382, 392 |
| Webster, section 4, No. 101..... | 382, 392 |
| West Henrietta, No. 62..... | 367, 392 |
| Montgomery county: | |
| Amsterdam-Minaville, No. 32..... | 236, 287 |
| Amsterdam-Minaville, section 2, No. 96..... | 244, 289 |
| Canajoharie-Sharon Springs, No. 120..... | 264, 286 |
| Fultonville-Glen, No. 107..... | 259, 285 |
| West Mohawk, No. 108..... | 259, 285 |
| Oneida county: | |
| Utica-Paris, No. 71..... | 310, 335 |
| Onondaga county: | |
| East Lake-Skaneateles, No. 122..... | 313, 335 |
| Fabius and Apulia, section 1, No. 49..... | 309, 335 |
| Fabius and Apulia, section 2, 75..... | 311, 335 |
| Fabius and Apulia, section 3, No. 123..... | 313, 335 |
| La Fayette, No. 76..... | 311, 335 |
| Marcellus-Marietta, No. 74..... | 311, 335 |
| West Lake, No. 48..... | 309, 335 |
| Orange county: | |
| Central Valley-Turner's, No. 115..... | 261, 285 |
| Cochecton turnpike, section 1, No. 113..... | 260, 285 |
| Cochecton turnpike, section 2, No. 43..... | 240, 288 |
| (Views facing pages 12, 14, 16, 22, 36.) | |
| Florida-Warwick, No. 93..... | 256, 284 |
| (Views facing pages 20 and 38.) | |
| Goshen-Florida, No. 44..... | 241, 288 |
| (View facing page 14.) | |

Highways improved — Continued:

Orange county — Continued:

| | PAGE. |
|---|----------|
| Middletown-Goshen, No. 95..... | 256, 284 |
| Middletown-Pine Bush, section 1, No. 45..... | 241, 288 |
| Middletown-Pine Bush, section 2, No. 114..... | 261, 285 |
| Montgomery-Goshen, No. 65..... | 252, 283 |
| Newburgh-Woodbury, No. 42..... | 240, 288 |
| Turner's-Monroe, No. 46..... | 249, 283 |
| Walden-Scott's Corners, No. 64..... | 251, 283 |

Rensselaer county:

| | |
|--|----------|
| Albia-Wynantskill, No. 77..... | 253, 284 |
| Barrick, No. 102..... | 257, 284 |
| Hoag's Corners, No. 55..... | 243, 289 |
| Troy and Brunswick, section 2, No. 25..... | 245, 282 |
| (Views facing pages 8, 18 and 32.) | |
| Troy and Burnswick, section 3, No. 84..... | 253, 284 |
| Troy and Greenbush, section 2, No. 26..... | 235, 287 |

Rockland county:

| | |
|---|----------|
| Grassy Point-Sherwood's Bridge, No. 90..... | 254, 284 |
| Nyack turnpike, section 1, No. 91..... | 255, 284 |

Saratoga county:

| | |
|---|----------|
| Glens Falls-Saratoga, section 1, No. 58..... | 244, 289 |
| Waterford-Mechanicville, section 1, No. 39..... | 238, 288 |
| Waterford-Mechanicville, section 2, No. 59..... | 251, 283 |

Schenectady county:

| | |
|--|----------|
| Quaker Street, section 1, No. 73..... | 252, 283 |
| Quaker Street, section 2, No. 105..... | 258, 285 |
| Quaker Street, section 3, No. 106..... | 258, 285 |

Ulster county:

| | |
|--|----------|
| Kingston-Rifton, No. 116A..... | 262, 285 |
| Kingston-Rifton, No. 116B..... | 262, 285 |
| Saugerties-Woodstock, section 1, No. 37..... | 238, 288 |
| Saugerties-Woodstock, section 2, No. 38..... | 248, 283 |
| Shandaken-Hurley, No. 118..... | 263, 285 |
| Ulster and Delaware, section 2, No. 117..... | 262, 285 |
| Ulster and Delaware turnpike, section 3, No. 31..... | 246, 283 |

Washington county:

| | |
|--|----------|
| Fort Edward-Sandy Hill, No. 85..... | 254, 284 |
| Granville-Troy Stage, No. 104..... | 245, 289 |
| Granville-Middle Granville, No. 103..... | 258, 284 |
| Shunpike, No. 97..... | 257, 284 |

Highways improved — Continued:

| | |
|--|--------------|
| Westchester county: | PAGE. |
| Ardsley-Elmsford, section 1, No. 18..... | 232, 287 |
| Ardsley-Elmsford, section 2, No. 34..... | 236, 288 |
| Armonk-Mt. Kisco, No. 50..... | 249, 283 |
| Briarcliff Manor-Echo Lake, No. 54..... | 250, 283 |
| (Views facing pages 10, 26 and 28.) | |
| Hastings-Ardsley, No. 17..... | 232, 287 |
| Mt. Kisco-Bedford, No. 51..... | 249, 283 |
| Mamaroneck-White Plains, No. 19..... | 233, 287 |
| McKeel's Corners-Briarcliff Manor, No. 53..... | 242, 288 |
| Unionville-McKeel's Corners, No. 52..... | 242, 288 |
| White Plains-Armonk, No. 20..... | 233, 287 |
| White Plains-Armonk, section 2, No. 35..... | 237, 288 |
| Hempstead Bay Canal: | |
| Survey of | 32 |
| Indian Reservation: | |
| New road | 45, 321 |
| Jamaica Bay Canal: | |
| Survey of | 32 |
| Laws: | |
| Highway improvement | 103, 107 |
| Wide tires | 113 |
| Lake Ontario: | |
| Commerce | 64 |
| Harbors on | 60 |
| Lighthouses | 61, 62 |
| Navigation of | 65 |
| Land Bureau | 28, 203 |
| League of American Wheelmen..... | 174 |
| Levels and Bench Marks | 37 |
| Little Sodus Harbor..... | 63 |
| Locks: | |
| Guard-lock, Geneva Lake. (See "Seneca Lake.") | |
| Repairs of | 395, 396 |
| Maps and field notes, old | 275 |
| Maps and monuments | 275 |

INDEX.

421

| | PAGE. |
|--|-------------------------|
| Massachusetts boundary line..... | 35 |
| Material for Roads: | |
| Freight rates, special..... | 195 |
| Reports upon | 12 |
| Sizes of | 360 |
| Tests of | 14 |
| Measurement of flow of Streams. (See Supplement.) | |
| Money System: | |
| Expressions | 147 |
| Law | 107 |
| Monuments and Maps: | |
| Examination of | 275 |
| New Jersey boundary line..... | 36 |
| New York boundaries..... | 32, 67 |
| Oak Orchard Harbor..... | 61 |
| Olcott Harbor | 61 |
| Old field notes and maps..... | 275 |
| Orient: | |
| Sea wall on Long Island..... | 45, 229, 273, 281, 282 |
| Ordinary Repairs of Canals: | |
| Division: | |
| Eastern | 267 |
| Middle | 294, 317 |
| Western | |
| Summary | 44, 406 |
| Oswego Canal..... | 7, 44, 45, 66, 298, 317 |
| Oswego Harbor | 64 |
| Owasco: | |
| Sea wall | 45, 324 |
| Oyster bed surveys..... | 28, 201 |
| Pennsylvania boundary line..... | 37 |
| Prison labor for highway improvement..... | 20 |
| Pultneyville Harbor | 62 |
| Regulating water of Seneca Lake. (See "Guard-lock.") | |

| | PAGE. |
|--|------------------------|
| St. Lawrence county line..... | 37, 46, 211, 273 |
| Sea Wall: | |
| Orient..... | 45, 229, 273, 281, 282 |
| Owasco | 45, 324 |
| Seneca Lake: | |
| Guard-lock and gates..... | 45, 297, 326, 333 |
| View of, facing | 298 |
| Seneca River: | |
| Water records | 293, 337 |
| Sewers: | |
| Geneva towpath | 45, 327 |
| Lock 66 dry-dock..... | 351 |
| Monroe avenue dry-dock..... | 398 |
| Shinnecock and Peconic Canal: | |
| History of | 31 |
| Improvement of..... | 45, 226, 272 |
| Contracts for | 287 |
| South Lake: | |
| Inserting pipes | 44, 321 |
| Special Examiner of Highways: | |
| Report | 12, 194 |
| Special freight rates on stone..... | 195 |
| Specifications: | |
| Changes | 8 |
| Standing Committee, Highway Convention: | |
| Report of | 121 |
| State Engineer: | |
| Duties | 5, 6 |
| Report | 5 |
| Streams: | |
| Gauging of discharge of. (See Supplement.) | |
| Supervisors' Convention: | |
| Delegates | 139 |
| Highway improvement | 21, 118 |

| | |
|---|----------------------|
| Surveys: | PAGE. |
| Barge canal | 7, 46, 229, 271, 286 |
| Boundary lines | 32, 67 |
| Canada line | 67 |
| Canals: | |
| History of | 7 |
| Co-operative, of State (See Supplement) | 30, 46, 230, 279 |
| Court of Claims | 27, 46 |
| Divisions: | |
| Eastern | 229, 274 |
| Middle | 329 |
| Western | 358, 403 |
| Forest Preserve Board | 46, 229, 274 |
| Highways | 9, 265, 315, 383 |
| Oyster beds | 28, 201 |
| Special | 46, 281 |
| St. Lawrence county line | 211 |
| Summary | 472 |
| Surveys for Highways: | |
| Divisions: | |
| Eastern | 265 |
| Middle | 315 |
| Western | 383 |
| Summary | 9 |
| Surveys, Special: | |
| Divisions: | |
| Eastern | 281 |
| Middle | 332 |
| Western | 342 |
| Summary | 46 |
| Tests: | |
| Cement | 25, 196 |
| Road material | 113 |
| Tonawanda Creek improvement | 395 |
| Vermont boundary line | 34 |
| Vertical Walls: | |
| Repair of | 397 |
| Tonawanda Dam | 394 |
| Water records | 293, 337 |
| Cayuga Lake | 293, 337 |

